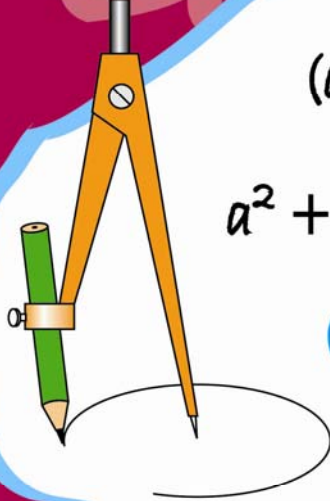


গণিত

সপ্তম শ্রেণি

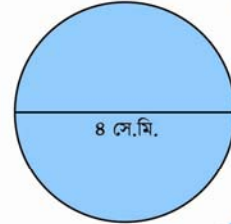
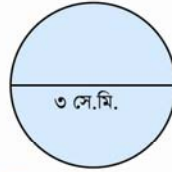


$$(a+b)^2 = a^2 + 2ab + b^2$$

$$a^2 + b^2 = (a+b)^2 - 2ab$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

অনুপাত



জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড, ঢাকা

RvZxq wk¶µg I cV"cy-K teW©KZ 2013 wk¶veI ¶_tK
mBg tk¶Yi cV"cy-Ki ¶c wba¶i Z

MwYZ
mBg tk¶Y

i Pbv
mv¶j n&gwZb
W. Agj nij`vi
W.Agj" P>`agÊj
tkL KZeDwi b
nwg`v evbyteMg
G.tK.Gg knx`j ¶&
tgt kvnRvnb wmi vR

m¶úv` bv
W. tgt Ave`j gwZb
W. Avã¶n Qvgv`

RvZxq wk¶µg I cV"cy-K teW©, XvKv

RvZxq wk¶µg I cv̄cȳ–K teW©

69–70 gwZwSj ewYwR̄K GjvKv, XvKv–1000

KZ℞ cKwkZ |

[cKvkK KZ℞ me[⊙]Zi msiw¶Z]

cix¶vgjK ms[–]<iY

cŭg cKvk : tm†p^αi, 2012

cv̄cȳ–K cŸq†b mgš[^]qK

tgt bwmī Dwī b

Kw̄úDūvi K†úvR

Kvjvi M̄ndK

cŰ`

mȳ kŰ evŌvi

m¶RvDj Av†e`xb

wPÎ v¼b

tgt Kŵei tnv†mb

wWRvBb

RvZxq wk¶µg I cv̄cȳ–K teW©

mi Kvi KZ℞ webvg†j` weZi†Yi Rb`

gy†Y :

$$c\hbar^{1/2} - K_v$$

۞K۞v R۞Z۞q R۞e۞bi m۞teP۞g۞L D۞b۞t۞bi c۞eR۞Z۞ Avi `۞Z c۞w۞ieZ۞B۞k۞j w۞et۞k۞i P۞v۞t۞j Ä t۞gv۞K۞v۞ej۞ v K۞ti
 e۞vs۞j۞ v۞t k۞t۞K D۞b۞t۞b I m۞gw۞x۞i w۞t۞K w۞bt۞q h۞vl q۞vi R۞b` c۞ö۞qv۞R۞b m۞y۞k۞۞۞۞Z R۞bk۞w۞³ | f۞vl۞ Av۞t۞۞ v۞j b I g۞p۞³h۞t۞x۞i
 t۞P۞Z۞bv۞q t۞k M۞ovi R۞b` ۞K۞۞۞v_۞A Aš۞w۞b۞w۞Z t۞gav I m۞æ۞te۞b۞vi c۞wi۞c۞Y۞w۞e۞K۞v۞t۞k m۞vn۞vh` Kiv g۞va۞wg۞K ۞K۞۞۞۞vi
 Ab`Zg j ۞۞| G0۞rov c۞ö۞wg۞K `۞i Aw۞R۞Z ۞K۞۞۞vi t۞gš۞vj K Ávb I `۞۞Z۞v m۞æ۞c۞h۞w۞i Z I m۞yn۞sn۞Z Kivi g۞va۞tg
 D`P۞Zi ۞K۞۞۞vi th۞M` K۞ti t۞Z۞vj۞vl G `۞i ۞K۞۞۞vi D۞t۞ik`| Ávb۞v۞R۞b۞i GB c۞ö۞qv۞i wf۞Zi w۞t۞q ۞K۞۞۞v_۞K
 t۞t۞ki A_š۞w۞ZK, m۞vg۞w۞RK, m۞vs`۞ZK I c۞wi۞tek۞MZ c۞U۞f۞gi t۞c۞۞۞t۞Z `۞۞ I th۞M` bv۞M۞wi K K۞ti t۞Z۞vj۞vl
 g۞va۞wg۞K ۞K۞۞۞vi Ab`Zg w۞eteP` w۞el q|

RvZxq ԿԿՊԵՆԶ-2010 Gi j ղԻ I Dfİk`K mvgtb tİtL cwi gwRZ ntqtQ gva`wgK `İi ԿԿՊԵՆԶ
cwi gwRZ GB ԿԿՊԵՆԶ RvZxq Av`k, ղԻ, Dfİk` I mgKvj xb Pvn`vi cİZdj b NUvtbv ntqtQ, tmB mvf`
ԿԿՊԵՆԶ i eqm, tgav I MhY ղԻZv Abhvx ԿԿԼbdj ԿԿԿ Y Kiv ntqtQ| GQrov ԿԿՊԵՆԶ `bwZK I
gwbwK gj`teva t`K İi` Kti BwZnm I HwZn` tPZbv, grnb gw`h`xİ tPZbv, ԿԿİ -mvnZ`-ms`
t`kcteva, cKwZ-tPZbv Ges ag`eyMvİ I bvx-cj`I ԿԿԿİ mevi cİZ mggh`teva RvMZ Kivi
tPov Kiv ntqtQ| GKw weÁvbgb` RvW MVİbi Rb` Rxeİbi cİZw tİtİ weÁvİbi `ZtİZ`cİqvM I
WvWUvj evsj v`İki İeKİ-2021 Gi j ղԻ ev`evgtb ԿԿՊԵՆԶ i mղԻ Kti tZvj vi tPov Kiv ntqtQ|

bZb GB wkqivutgi Avtj vtK cŷXz ntqtQ gva'wgK -tii cŷq mKj cW'cy-K| D³ cW'cy-K cŷqtb
wkqiv_ŷ'i mvg_°, cŷYZv I ce°AwfÁZvtK ,itzi mt½ wetePbv Kiv ntqtQ| cW'cy-K,tjvi wel q
wbePb I Dc~vc̣bi t†† wkqiv_ŷ mRbkxj cŷZfvi weKvk mvatbi w`tk wetkl fvre ,iz;t`lqv ntqtQ|
cŷZw Aa'vtqi i'itZ wkLbdj hy³ Kti wkqiv_ŷ AwRZe` Ávtbi Bw½Z cŷvb Kiv ntqtQ Ges wenPÎ KvR,
mRbkxj cŷkel Ab'vb` cŷkmsthvRb Kti gj`vqḅtK mRbkxj Kiv ntqtQ|

GKwesk kZtKi GB htm Ávb-weÁvtbi weKvtk MwytZi fngKv AZxe ,iZcyŲ iayZvB bq, e"³MZ Rxeb t_tK i i"Kti cwii ewii K l mvgwRK RxeŲbi MwytZi cŲqm AŲbK teŲtŲŲ| GB me wel q weŲePbvq tiŲL wbggva"wgK chŲq bZb MwyYwZK wel q wKŲvŲ_DcŲhvMx l Avb>`vqK Kti tZjy vi Rb" MwyZtK mnR l my`i fvtŲe Dc`vcb Kiv ntŲtŲ Ges tek wKQ-bZb MwyYwZK welŲq Ašf® Kiv ntŲtŲŲ|

GKmesk kZtKi A½xKvi l cZ"qtK mvgtb titL cwi gwRZ wk¶vutgi AvtjvtK cW"cy-KwU iWpZ ntqtQ| KvRB cW"cy-KwU Avil mgw×mvaſbi Rb" thtKvſbv MVBgjK l hy³m½Z civgk©.itZji mt½ weteWpZ nte| cW"cy-K cWqſbi wecj KgſtÁi gta" AwZ-^r mgtqi gta" cy-KwU iWpZ ntqtQ| dtj wKQz fj îW t_ſK thtZ cwti| cieZPms<iY,tj vtZ cW"cy-KwUſK Avil my'i, tkvfb l îWgſ Kivi tPóv Ae"vNZ, _vKſe| evbvtbi t¶ſt AbmZ ntqtQ evsj v GKvſWgx KZK cWxZ evbvtbiwZ|

cV'cȳ-KwJ i Pbv, m=úv`bv, wPÎv¼b, bgbv cĕkw` cŸqb | cĕkvbvi KvR hviv Avšwi Kfıte tgav | kȳ
w`ıtq0b Zıf`i ab`ev` Āvcb KiwQ | cV'cȳ-KwJ wkŸıv_ıf`i Avbw`Z cV | cŸ`wkZ`ŸŸZv ARŸ wbwŸZ
KiŸe etj Avkv Kwı |

cōdmi tgv̄t tgv̄-—dv̄ Kv̄gv̄j Dwī b
 †Pqvi ḡvb
 Rv̄Zxq wk̄†jv̄uḡ I cw̄-cȳ-K teW̄[©]Xv̄Kv̄

mPcÎ

Aa"tqi	Aa"tqi ktivbg	côv
cŭg	gj` I Agj` msL`v	1-15
wZxq	mgvbjvZ I jvf-ŋwZ	16-34
ZZxq	cwi gvc	35-43
PZ _L ®	exRMwYZxq iwiki ,b I fVM	44-61
cÂg	exRMwYZxq mfvewj I cŋqvM	62-79
lô	exRMwYZxq fMusk	80-90
mB̂g	mij mgxKiY	91-105
Aóg	mgvšivj mij tiLv	106-112
beg	wî fR	113-129
`kg	meŋgZv I m`kZv	130-144
GKv`k	Z_ I DcvĚ	145-156
	DĚi gvjv	152-156

সব ধরনের ই-বুক ডাউনলোডের জন্য

MyMahbub.Com

c0g Aa'vq gj` I Agj` msL'v

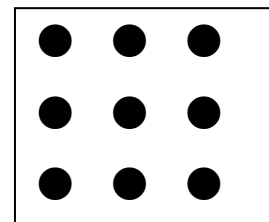
^ePÎ"gg cKwZi GB ^ePÎ" Avgiv MYbv I msL'vi mrvvth" Dcj wä Kwi | ce@Zx^tk0YtZ Avgiv ^vfwK msL'v, cYmsL'v I fMusk mæútk^aviYv tctqW hv gj` msL'v wntmte cwiwPZ | G msL'v,tj vtK ^Bw cYmsL'vi AbcvfZ cKvk Kiv hvq | msL'vRMtZ wKQzmsL'v itqtQ th,tj v ^Bw cYmsL'vi AbcvfZ cKvk Kiv hvq bv | G,tj v Agj` msL'v bvtg cwiwPZ | G Aa'vtq Avgiv Agj` msL'vi mvf_ cwiwPZ ntq Gt` i c0qvM mæútk^Avtj vPbv Kie |

Aa'vq tktl wkq|v_ñv—

- gj` I Agj` msL'v kbv³ KitZ cvi te |
- msL'vtiLvq gj` I Agj` msL'vi Ae^vb t`LvZ cvi te |
- msL'vi eM^ eMgj e'vL'v KitZ cvi te |
- Drcv`K I fvm c0qvM gva'tg eMgj wbyq KitZ cvi te |
- msL'vi eMgj c×wZ,tj v c0qvM Kti ev^e Rxe'tb mgm'vi mgvavb KitZ cvi te |

1.2 eM^ eMgj

eM^GKw AvqZ, hvi evú,tj v ci^úi mgvb | eM^ evúi ^N^0K0 GKK ntj eM^tj i tqt dj nte K × K eM^GKK ev K² eM^GKK | wexZfvte, eM^tj i tqt dj K² eM^GKK ntj, Gi c0Zw evúi ^N^nte 0K0 GKK |



wPtÎ, 9w gvtetjK eM^Kvti mrvvthv ntqtQ | mgvb ^tZi c0Zw mwitZ 3w Kti 3w mwitZ gvtetj mrvvthv AvtQ Ges tgvU gvtetj i msL'v $3 \times 3 = 3^2 = 9$ | GLv'tb, c0Z`K mwitZ gvtetj i msL'v Ges mwit i msL'v mgvb | ZvB wPtÎw eM^KwZi ntqtQ | dtj 3 Gi eM^ Ges 9 Gi eMgj 3 |

∴ tKv'tbv msL'vtK tmB msL'v 0viv ,Y Kitj th ,Ydj cvl qv hvq Zv H msL'vi eM^Ges msL'w ,Ydtj i eMgj |

Gevi mviwY t₁t₂K GKK $\bar{v}b$ 1 i tqtQ Ggb eMmsL \bar{v} wB |

eMmsL \bar{v}	msL \bar{v}
1	1
81	9
121	11
361	19

GKK $\bar{v}bxq$ A $\frac{1}{4}$ 1 ev 9 ntj ,
Gi eMmsL \bar{v} i GKK $\bar{v}bxq$
A $\frac{1}{4}$ 1 nte

GKbf $\bar{v}te$

eMmsL \bar{v}	msL \bar{v}
9	3
49	7
169	13

msL \bar{v} i GKK $\bar{v}bxq$ A $\frac{1}{4}$ 3 ev
7 ntj Gi eMmsL \bar{v} i GKK
 $\bar{v}b$ 9 nte

Ges

eMmsL \bar{v}	msL \bar{v}
16	4
36	6
196	14
256	16

GKK $\bar{v}bxq$ A $\frac{1}{4}$ 4 ev 6 ntj ,
Gi eMmsL \bar{v} i GKK $\bar{v}b$ 6
 $\bar{v}Kte$

KvR :

1 | mviwY t₁t₂K eMmsL \bar{v} i GKK $\bar{v}b$ 4 i tqtQ Gi/c msL \bar{v} i Rb \bar{v} wbgg $\bar{v}Zwi$ Ki |

2 | wbtPi msL \bar{v} $\bar{v}tj$ vi eMmsL \bar{v} i GKK $\bar{v}bxq$ A $\frac{1}{4}$ w KZ nte?

1273, 1426, 13645, 9876474, 99580

wbtP eMgj mn KtqKw cY \bar{v} eMmsL \bar{v} i Zwj Kv t \bar{v} l qv nj :

eMmsL \bar{v}	eMgj	eMmsL \bar{v}	eMgj	eMmsL \bar{v}	eMgj
1	1	64	8	225	15
4	2	81	9	256	16
9	3	100	10	289	17
16	4	121	11	324	18
25	5	144	12	361	19
36	6	169	13	400	20
49	7	196	14	441	21

eMgij i Pý

eMgij cKviki Rb` Bw cZxKipý e'eüZ nq| 25 Gi eMgij tevSvZ tj Lv nq $\sqrt{25}$ ev $(25)^{\frac{1}{2}}$ |
Avgiv Rwb, $5 \times 5 = 25$, KvRB 25 Gi eMgij 5 |

KvR : KtqKw msL'v wbtq cY'eMmsL'vi Zvwj Kv`Zwi Ki |

YbxqtKi mrvnth` eMgij wbyq :

Avgiv Rwb, $16 = 4 \times 4 = 4^2$

∴ 16 Gi eMgij 4

∴ 16 tK tgšwj K YbxqtK wtkHY Kti cvB

$$16 = 2 \times 2 \times 2 \times 2 = (2 \times 2) \times (2 \times 2)$$

cZ tRvov t_tK GKw Kti YbxqK wbtq cvB $2 \times 2 = 4$

∴ 16 Gi eMgij $= \sqrt{16} = 4$

Avevi, $36 = 6 \times 6 = 6^2$

∴ 36 Gi eMgij 6

∴ 36 tK tgšwj K YbxqtK wtkHY Kti cvB,

$$36 = 2 \times 2 \times 3 \times 3 = (2 \times 2) \times (3 \times 3)$$

cZ tRvov t_tK GKw Kti YbxqK wbtq cvB $2 \times 3 = 6$

$$36 \text{ Gi eMgij } = \sqrt{36} = 6$$

j¶ Kw : YbxqtKi mrvnth` tKvtrv cY'eMmsL'vi eMgij wbyq Kivi mgq –

(1) c_tg c_ E msL'wutK tgšwj K YbxqtK wtkHY KtiZ nte |

(2) cZ tRvov GKB YbxqtK GKmv_t cvkvcwk wj LtZ nte |

(3) cZ tRvov GK RvZxq YbxqtKi cwi etZ GKw YbxqK wbtq wj LtZ nte |

(4) cB YbxqK_tj vi avivevwnK Ydj nte wbtYq eMgij |

D`vniY 1 | 3136 Gi eMgij wbyq Ki |

mgvavb :

$$\begin{array}{r} 2 \overline{) 3136} \\ 2 \overline{) 1568} \\ 2 \overline{) 784} \\ 2 \overline{) 392} \\ 2 \overline{) 196} \\ 2 \overline{) 98} \\ 7 \overline{) 49} \\ 7 \end{array}$$

$$\begin{aligned} \text{GLv}b, 3136 &= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 \times 7 \\ &= (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (7 \times 7) \end{aligned}$$

$$\therefore 3136 \text{ Gi eM}j = \sqrt{3136} = 2 \times 2 \times 2 \times 7 = 56$$

KvR : „YbxqtKi mrvth“ 1024 Ges 1849 Gi eMj wYq Ki |

1.3 fvMi mrvth“ eMj wYq

GKw D`vniY w`tq fvMi mrvth“ eMj wYq c×wZ t`Lvbn t:j v :

D`vniY 2 | fvMi mrvth“ 2304 Gi eMj wYq Ki :

mgvarb :

- | | |
|--|---|
| (1) 2304 msL`wU wj wL : | 23 04 |
| (2) Wwbw`K t`K`BwU Kti A¼ wbtq tRvov Kw
cQZ`K tRvovi Dci ti LwPy w`B : | $\overline{23 \ 04}$ |
| (3) fvMi mgq thgb Lvov`vM t`I qv nq,
Wwbcvfk Z`jc GKwU Lvov`vM w`B : | $\overline{23 \ 04} \mid$ |
| (4) cUg tRvowU 23 Gi ceZPeMmsL`wU 16,
hvi eMj $\sqrt{16}$ ev 4 ; Lvov`vMi Wwbcvfk 4 wj wL
GLb 23 Gi wK wbtP 16 wj wL : | $\begin{array}{r l} \overline{23 \ 04} & 4 \\ \hline 16 & \end{array}$ |
| (5) GLb 23 t`K 16 wetqvM Kw : | $\begin{array}{r l} \overline{23 \ 04} & 4 \\ \hline 16 & \\ \hline 7 & \end{array}$ |
| (6) wetqvMdj 7 Gi Wwb cieZPtRvov 04 emvB
704 Gi evgw`tK Lvov`vM (fvMi wPy) w`B : | $\begin{array}{r l} \overline{23 \ 04} & 4 \\ \hline 16 & \\ \hline 7 \ 04 & \end{array}$ |
| (7) fvMdtj i Nti i msL`v 4 Gi wY 4 × 2 ev 8
wbtPi Lvov`vMi evgcvtk emvB 8 Ges Lvov`vMi gta`GKwU A¼ emvfbvi gtZv`vb i wL : | $\begin{array}{r l} \overline{23 \ 04} & 4 \\ \hline 16 & \\ \hline 8 \ 7 \ 04 & \end{array}$ |

- (8) GLb GKwJ GK A¼i msL`v LjR tei Kwi hvK 8 Gi
 Wbcrk emtq c03 msL`vK H msL`wJ 0viv Y Kti
 704 Gi mgvb ev Abp¶704 cvl qv hvq|
 Gt¶tÎ 8 nte| 8 msL`wJ fMdtj I
 4 Gi Wbcrk emvB|

$$\begin{array}{r} \overline{23\ 04} \mid 48 \\ 16 \\ 88 \overline{7\ 04} \\ \underline{7\ 04} \\ 0 \end{array}$$

- (9) fMdtj i `vfb cvl qv tMj 48| GwJB wbYq eMgj |
 $\therefore \sqrt{2304} = 48$

`be` : fvMi mnvth` eMgj wbYq Kivi mgq msL`vi Wb w` K t_tK tRvo ewtZ wltq tkl A¼i tRvo bv
 _vKtj GtK tRvov QvovB MY` Ki tZ nte|

D`vniY 3| fvMi mnvth` 31684 Gi eMgj wbYq Ki |

mgvrb :

$$\begin{array}{r} 3\ \overline{16\ 84} \mid 178 \\ 1 \\ 27 \overline{216} \\ 189 \\ 348 \overline{2784} \\ \underline{2784} \\ 0 \end{array}$$

$$\therefore 31684 \text{ Gi eMgj} = \sqrt{31684} = 178$$

wbYq eMgj 178|

KvR : fvMi mnvth` 1444 Ges 10404 Gi eMgj wbYq Ki |

eMmsL`v I eMgj m¶tÜ Dtj 0L` wclq :

- (1) tKvfbv msL`vi c0Z tRvov tgSwj K Drcv` tKi Rb` H msL`vi eMgj GKwJ Kti YbxqK wltZ nq|
- (2) th msL`vi meWbw` tKi A¼ A_¶ GKK `vbxq A¼ 2 ev 3 ev 7 ev 8 Zv cYEM¶q|
- (3) th msL`vi tktl wltRvo msL`K kb` _vtK, H msL`v cYEM¶q|
- (4) GKK `vbxq A¼ 1 ev 4 ev 5 ev 6 ev 9 ntj , H msL`v cYEM¶tZ cvti | thgb : 81, 64, 25, 36, 49 BZ`w` eMmsL`v|
- (5) Avevi msL`vi Wbw` tK tRvomsL`K kb` _vKtj H msL`v cYEM¶tZ cvti | thgb : 100, 4900 BZ`w` eMmsL`v |
- (6) tKvfbv msL`vi GKK `vbxq A¼ t_tK `i i` Kti evgw` tK GK A¼ ci ci hZwJ tduLv t` I qv hvq, Gi eMgj i msL`wJ ZZ A¼wewkó|

thgb, $\sqrt{81} = 9$ (GK A¼wekó, GLvfb tduUvi msL'v 1 KviY, 81)

$\sqrt{100} = 10$ (B A¼wekó, GLvfb tduUvi msL'v 2 KviY, 100)

$\sqrt{47089} = 217$ (wZb A¼wekó, GLvfb tduUvi msL'v 3 KviY, 47089)

KvR : 1| 529, 3925, 5041 Ges 4489 msL'v,tj vi eMqj msL'vi GKK vbxq A¼ wYq Ki |
2| 3136, 1234321 Ges 52900 msL'v,tj vi eMqj KZ A¼wekó Zv wYq Ki |

D`vniY 4| 8655 t_tK tKvb qiz Zg msL'v wetaqM Ki tj wetaqMdj GKwU cYemmsL'v nte?

mgvavb :

86 55	93
81	
5 55	
5 49	
6	

GLvfb, 8655 Gi eMqj fvMi mnvth' wYq Ki tZ wMq 6 Aekó vK|
mZivs c0 E msL'v t_tK 6 ev` w tj c0B msL'wU cYemmsL'v nte|
wbYq qiz Zg msL'v 6

D`vniY 5| 651201 Gi mv_t tKvb qiz Zg msL'v thvM Ki tj thvMdj GKwU cYemmsL'v nte?

mgvavb :

65 12 01	806
64	
1 12 01	
96 36	
15 65	

thtnZz msL'wUi eMqj wYq Kivi mgq fvMtkl 1565 AvtQ| KvRB c0 E msL'wU cYemmsL'v bq|
651201 Gi mv_t tKvbw GKwU qiz Zg msL'v thvM Ki tj thvMdj cYemnte Ges ZLb Gi eMqj nte
806 + 1 = 807

807 Gi eM= 807 × 807 = 651249

wbYq qiz Zg msL'wU = 651249 – 651201
= 48

Abkxj bx 1.1

- 1| „YbxqtKi mrvnt`h` eMgj` wbyq Ki :
(K) 169 (L) 529 (M) 1521 (N) 11025
- 2| fvtMi mrvnt`h` eMgj` wbyq Ki :
(K) 225 (L) 961 (M) 3969 (N) 10404
- 3| wbtPi msL`v „tj vtK tKvb qiz Zg msL`v Øviv „Y Ki tj „Ydj cYEMmsL`v nte?
(K) 147 (L) 384 (M) 1470 (N) 23805
- 4| wbtPi msL`v „tj vtK tKvb qiz Zg msL`v Øviv fVM Ki tj fVMdj cYEMmsL`v nte?
(K) 972 (L) 4056 (M) 21952
- 5| 4639 t_tK tKvb qiz Zg msL`v wetqvM Ki tj wetqvMdj GKwU cYEMmsL`v nte?
- 6| 5605 Gi mvt_ tKvb qiz Zg msL`v thvM Ki tj thvMdj GKwU cYEMmsL`v nte?

1.4 `kugK fMstki eMgj` wbyq

cYmsL`v ev ALØ msL`vi eMgj` fvtMi mrvnt`h` thfvt wbyq Kiv ntqtQ, `kugK fMstki eMgj` I tmB wbtqB wbyq Kiv nq| `kugK fMstki `BwU Ask _vtK| `kugK we`j evgw` tKi Ask tK ALØ ev cYAsk Ges `kugK we`j Wbctki Ask tK `kugK Ask ej v nq|

eMgj` Kivi wbgg

- (1) ALØ Astk GKK t_tK µgvštq evgw` tK cŁZ `B At¼i Dci `vM w` tZ nq|
- (2) `kugK Astk `kugK we`j Wbctki A¼ t_tK i i“ Kti Wbw` tK µgvštq tRvovq tRvovq `vM w` tZ nq| Gi#c hw` t`Lv hvq mefk tI gvĀ GKwU A¼ ewK AvtQ, Zte Zvi cti GKwU kb` eimtg `B At¼i Dci `vM w` tZ nq|
- (3) mrvavi Y wbtq eMgj` wbyqi cŁµqvq ALØ Astki KvR tkl Kti `kugK we`j cti i cŁg `BwU A¼ bvgvtbvi AvtMB eMgtj `kugK we`j w` tZ nq|
- (4) `kugK we`j GK tRvov ktb`i Rb` eMgtj `kugK we`j ci GKwU kb` w` tZ nq|

D`vniY 1| 26.5225 Gi eMgj wbYq Ki |

mgvavb :

$$\begin{array}{r} \overline{26} \cdot \overline{52} \overline{25} \mid 5 \cdot 15 \\ 25 \\ 101 \overline{) 152} \\ \underline{101} \\ 1025 \overline{) 5125} \\ \underline{5125} \\ 0 \end{array}$$

$$w_{b \dagger Y q} e_{M g j} = 5.15$$

Avm bægv t b eM Gj w b Y q

D`vniY 3| 9.253 Gi eMgj wZb `kmgK ~vb chS~wbYq Ki |

mgvavb :

$$\begin{array}{r} \overline{9} \cdot \overline{25} \overline{30} \overline{00} \overline{00} \mid 3 \cdot 0418 \\ 9 \\ 604 \overline{) 2530} \\ \underline{2416} \\ 6081 \overline{) 11400} \\ \underline{6081} \\ 60828 \overline{) 531900} \\ \underline{486624} \\ 45276 \end{array}$$

$$w_{\text{b}} + Y_{\text{q}} e_{\text{M}} g_{\text{j}} = 3.042 \text{ (c0q)}$$

`be": Dctii eMgtj `kngtKi ci PZL©A¼U 8 nl qvq ZZxq A¼Ui mrt_ 1 thvM Kti wbtYq eMgtj i
 (wZb `kngK `vb chS) Avmbægvb nj 3·042|

Ambægvb tei Kivi wbgg

- (1) $\beta \cdot k_{\text{IK}} \cdot v_{\text{ch}} \cdot e_{\text{Mg}} \cdot w_{\text{Yq}} \cdot K_{\text{tZ}} \cdot n_{\text{tj}}, w_{\text{Zb}} \cdot k_{\text{IK}} \cdot v_{\text{ch}} \cdot e_{\text{Mg}} \cdot w_{\text{Yq}} \cdot K_{\text{tZ}} \cdot n_{\text{te}}|$
- (2) $w_{\text{Zb}} \cdot k_{\text{IK}} \cdot v_{\text{ch}} \cdot e_{\text{Mg}} \cdot w_{\text{Yq}} \cdot K_{\text{tZ}} \cdot n_{\text{tj}}, m_{\text{SL}} \cdot v_{\text{i}} \cdot k_{\text{IK}} \cdot w_{\text{ex}} \cdot j \cdot c_{\text{i}} \cdot K_{\text{gct}} \cdot \eta \cdot 6_{\text{W}} \cdot A_{\frac{1}{4}} \cdot w_{\text{tZ}} \cdot n_{\text{q}}|$
 $\cdot i \cdot K_{\text{vi}} \cdot n_{\text{tj}} \cdot W_{\text{bw}} \cdot t_{\text{Ki}} \cdot t_{\text{kl}} \cdot A_{\frac{1}{4}} \cdot i \cdot c_{\text{i}} \cdot q_{\text{v}} \cdot R_{\text{bg}} \cdot t_{\text{Zv}} \cdot k_{\text{b}} \cdot e_{\text{mt}} \cdot Z \cdot n_{\text{q}}|$
 $G_{\text{tZ}} \cdot m_{\text{SL}} \cdot v_{\text{i}} \cdot g_{\text{tbi}} \cdot c_{\text{wie}} \cdot Z_{\text{B}} \cdot n_{\text{q}} \cdot b_{\text{v}}|$
- (3) $e_{\text{Mg}} \cdot t_{\text{j}} \cdot h_{\text{Z}} \cdot k_{\text{IK}} \cdot v_{\text{ch}} \cdot e_{\text{Mg}} \cdot w_{\text{Yq}} \cdot K_{\text{tZ}} \cdot n_{\text{te}} \cdot G_{\text{i}} \cdot c_{\text{t}} \cdot i \cdot A_{\frac{1}{4}} \cdot W_{\text{U}} \cdot 0, 1, 2, 3 \text{ ev } 4 \cdot n_{\text{tj}} \cdot c_{\text{te}} \cdot P \cdot A_{\frac{1}{4}} \cdot i \cdot m_{\text{t}} \cdot t_{\text{j}} \cdot 1 \cdot t_{\text{hv}} \cdot M \cdot n_{\text{te}} \cdot b_{\text{v}}|$

(4) eMgj hZ`kigK`vb chS`wbYq KiTZ nte Gi ctii A $\frac{1}{4}$ U 5, 6, 7, 8 ev 9 ntj cteP At $\frac{1}{4}$ i mvt_ 1 thM nte|

KvR : 1| 50.6944 Gi eMgj wbYq Ki |

2| 7.12 Gi eMgj`β`kigK`vb chS`wbYq Ki |

1.5 cY[©]eM[©]fMusk

$$\frac{50}{32} \text{ tK j } \text{wNô AvKvti wj tL cvB } \frac{25}{16}$$

GLvtb, $\frac{25}{16}$ fMusk_i je 25 GK_U cY[©]eM_sL^v Ges ni 16 GK_U cY[©]eM_sL^v| mZi vs $\frac{25}{16}$ GK_U cY[©]eM[©]fMusk |

∴ tKvtbv fMusk_i je I ni cY[©]eM_sL^v ev fMusk_iK j wNô AvKvti cwiYZ KiTj hw` Zvi je I ni cY[©]eM_sL^v nq, Zte H fMusk_iK cY[©]eM[©]fMusk ej v nq |

1.6 fMusk_i eMgj

fMusk_i jtei eMgj tK ntii eMgj Øviv fM KiTj fMusk_i eMgj cvlqv hvq| ni hw` cY[©]eM_sL^v bv nq, Zte ,Yb Øviv GtK cY[©]eM[©]Kti wbtZ nq |

$$\text{D`vniY 4| } \frac{64}{81} \text{ Gi eMgj wbYq Ki |}$$

$$\begin{aligned} \text{mgvab : fMusk}_U \text{ je } 64 \text{ Gi eMgj} &= \sqrt{64} = 8 \\ \text{Ges ni } 81 \text{ Gi eMgj} &= \sqrt{81} = 9 \end{aligned}$$

$$\therefore \frac{64}{81} \text{ Gi eMgj} = \sqrt{\frac{64}{81}} = \frac{8}{9}$$

$$\text{wbYq eMgj} = \frac{8}{9}$$

$$\text{D`vniY 5| } 52 \frac{9}{16} \text{ Gi eMgj wbYq Ki |}$$

$$\text{mgvab : } 52 \frac{9}{16} \text{ Gi eMgj} = \sqrt{52 \frac{9}{16}} = \sqrt{\frac{841}{16}} = \frac{29}{4} = 7 \frac{1}{4}$$

$$\therefore 52 \frac{9}{16} \text{ Gi eMgj} = 7 \frac{1}{4}$$

$$D^{\text{vniY}} 6 | 2 \frac{8}{15} \text{ Gi eMgj } \text{wZb}^{\text{`kngK}} \text{ `vb chS-wbYq Ki |}$$

$$\text{mgvarb} : 2 \frac{8}{15} \text{ Gi eMgj}$$

$$= \sqrt{2 \frac{8}{15}} = \sqrt{\frac{38}{15}} = \sqrt{\frac{38 \times 15}{15 \times 15}}$$

$$= \sqrt{\frac{570}{225}} = \frac{23 \cdot 8747}{15} = 1.5916 \text{ (cŕq)}$$

$$\therefore \text{wZb}^{\text{`kngK}} \text{ `vb chS-eMgj} = 1.592 \text{ (cŕq)}$$

$$\text{KvR} : 1 | 27 \frac{46}{49} \text{ Gi eMgj } \text{wbYq Ki |}$$

$$2 | 1 \frac{4}{5} \text{ Gi eMgj } \text{`B}^{\text{`kngK}} \text{ `vb chS-wbYq Ki |}$$

1.7 gj` I Agj` msL`v

1,2,3,4, BZ`w` `vfweK msL`v | msL`v, tj vK fMusk AvKvŕi wbgŕŕc tj Lv hvq |

$$1 = \frac{1}{1}, 2 = \frac{2}{1}, 3 = \frac{3 \times 2}{2} = \frac{6}{2}, \dots \dots \dots \text{BZ}^{\text{`w`}} |$$

Averi, 0.1, 1.5, 2.03, BZ`w` `kngK msL`v |

$$\text{GLvŕb}, 0.1 = \frac{1}{10}, 1.5 = \frac{15}{10}, 2.03 = \frac{203}{100} \text{ hv msL}^{\text{`v, tj vi}} \text{ fMusk AvKvi |}$$

$$\text{Averi}, 0 = \frac{0}{1}, \text{ GKwU fMusk msL}^{\text{`v}} |$$

Dcti eWYZ msL`v, tj v gj` msL`v |

AZGe, kb, mKj `vfweK msL`v I fMusk msL`v gj` msL`v |

Agj` msL`v : $\sqrt{2} = 1.4142135 \dots \dots \dots$ msL`vi `kngŕKi cŕi A¼ msL`v wv`ŕ bq | dtj fMusk AvKvŕi tj Lv hvq bv | Abjŕc $\sqrt{3}, \sqrt{5}, \sqrt{6}, \dots \dots \dots$ BZ`w` msL`v, tj vK fMusk AvKvŕi cKvk Kiv hvq bv | G, tj v Agj` msL`v |

j ¶ Kwŕ : $\sqrt{2}, \sqrt{3}, \sqrt{5}, \sqrt{6}, \dots \dots \dots$ BZ`w` Agj` msL`v Ges 2,3,5,6, BZ`w` cY`eMmsL`v bq | mZŕvs cY`eMmsL`v bq Giŕc msL`vi eMgj Agj` msL`v |

D`vni Y 7 | $0 \cdot 12, \sqrt{25}, \sqrt{72}, \sqrt{\frac{4}{9}}, \frac{\sqrt{49}}{7}$ msL`v, tj v t_#K Agj` msL`v evQvB Ki |

mgvavb : GLv#b, $0 \cdot 12 = \frac{12}{100} = \frac{3}{25}$; hv GKwU fMusk msL`v

$\sqrt{25} = \sqrt{5^2} = 5$, hv GKwU `vfweK msL`v

$\sqrt{72} = \sqrt{2 \times 36} = \sqrt{2 \times 6^2} = 6\sqrt{2}$; hv fMusk AvKv#i tj Lv hvq bv |

Ges $\frac{\sqrt{49}}{7} = \frac{\sqrt{7^2}}{7} = \frac{7}{7} = 1$; hv GKwU `vfweK msL`v |

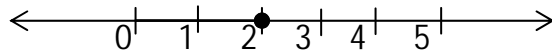
$\therefore 0 \cdot 12, \sqrt{25}, \frac{\sqrt{49}}{7}$ gj` msL`v Ges $\sqrt{72}$ Agj` msL`v |

KvR : $1\frac{1}{2}, \sqrt{\frac{4}{25}}, \sqrt{\frac{27}{16}}, 1 \cdot 0563, \sqrt{32}, \sqrt{121}$ msL`v, tj v t_#K gj` I Agj` msL`v tei Ki |

1.8 gj` I Agj` msL`v#K msL`v#i Lvq cKvk

gj` msL`vi msL`v#i Lv

wb#Pi msL`v#i LwU j ¶ Kwi :



Dcti i msL`v#i LwU#Z Mvp wPyZ AskwU 2 wb` R Kti |

Averi,

Dcti i msL`v#i LwU#Z Mvp wPyZ AskwU Ae`vb 1 I 2 gv#S | Mvp wPyZ AskwU#Z 4 fv#Mi 3 Ask |

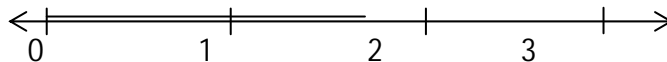
mZi vs wPyZ AskwU $1 + \frac{3}{4}$ ev $1\frac{3}{4}$ wb` R Kti |

Agj` msL`vi msL`v#i Lv :

$\sqrt{3}$ GKwU Agj` msL`v thLv#b, $\sqrt{3} = 1.732 \dots\dots\dots = 1.7$ (c#q) |

Gevi msL`v#i Lvq 1 I 2 Gi gv#Si Ask#K mgvb 10 Astk fvM Kti m#Bg AskwU Mvp Kwi hv c#q 1.7 Z_v

$\sqrt{3}$ wb` R Kti |



AZGe Mvp wPyZ AskwU $\sqrt{3}$ Gi msL`v#i Lv |

KvR :

1 | $3, \frac{3}{2}, 1.455$ Ges $\sqrt{5}$ msL`v, tj v msL`v#i Lvq t` Lvl |

D`vni Y 8 | tKv#bv evMv#b 1296w AvgMvQ Av#Q | evMv#bi ^`N°I c#`i Dfq w`#Ki c#Z`K mwi#Z mgvb
msL`K AvgMvQ _vK#j c#Z`K mwi#Z Mv#Qi msL`v wbY# Ki |

mgvavb : evMv#bi ^`N°I c#`i Dfq w`#Ki c#Z`K mwi#Z mgvb msL`K AvgMvQ Av#Q |

∴ c#Z`K mwi#Z AvgMv#Qi msL`v nte 1296 Gi eM#j |

$$\begin{array}{r} \text{GLb,} \quad \overline{12\ 96} \mid 36 \\ \quad \quad \quad 9 \quad \mid \\ 66 \quad \overline{3\ 96} \\ \quad \quad \quad 3\ 96 \\ \hline \quad \quad \quad 0 \end{array}$$

wb#Y# AvgMv#Qi msL`v 36 w |

D`vni Y 9 | GKwU `wDU `j #K 9, 10, Ges 12 mwi#Z mvRv#bv hvq | Avevi Zv#`i eM#v#i I mvRv#bv hvq |
H `wDU `#j Kgct# KZRb `wDU i#q#Q |

mgvavb : `wDU `j #K 9, 10 Ges 12 mwi#Z mvRv#bv hvq | d#j `wDU Gi msL`v 9, 10 Ges 12 Øviv
wefvR` | Gifc #z Zg msL`v nte 9, 10 Ges 12 Gi j .mv. . |

$$\begin{array}{r} \text{GLv#b,} \quad 2 \mid 9, 10, 12 \\ \quad \quad \quad 3 \mid 9, 5, 6 \\ \hline \quad \quad \quad 3, 5, 2 \end{array}$$

∴ 9, 10 Ges 12 Gi j .mv. . = $2 \times 2 \times 3 \times 3 \times 5 = (2 \times 2) \times (3 \times 3) \times 5$

c#B j .mv. . $(2 \times 2) \times (3 \times 3) \times 5$ tK eM#v#i mvRv#bv hvq bv |

$(2 \times 2) \times (3 \times 3) \times 5$ tK eM#sL`v Ki#Z n#j Kgct# 5 Øviv .Y Ki#Z nte |

∴ 9, 10 Ges 12 mwi#Z Ges eM#v#i mvRv#bvi Rb` `wDU Gi msL`v c#qvRb

$(2 \times 2) \times (3 \times 3) \times (5 \times 5) = 900$

wb#Y# `wDU Gi msL`v 900 |

Abĵxĵ bx 1.2

1| $\frac{289}{361}$ Gi eMĵj KZ?

(K) $\frac{13}{19}$

(L) $\frac{17}{19}$

(M) $\frac{19}{13}$

(N) $\frac{19}{17}$

2| 1.1025 Gi eMĵj KZ?

(K) 1.5

(L) 1.005

(M) 1.05

(N) 0.05

wbĵP Z` tĵK 3–5 bs cĵkĵ DĒi `vl :

3| `BĵU ĵugK msL`vi eĵMP Ašĵ 25|

(1) GKĵU msL`v 12 ntĵ AcĵU KZ?

(K) 5

(L) 9

(M) 11

(N) 13

(2) msL`v `BĵU eMĵKx Kx?

(K) 144, 169

(L) 121, 144

(M) 169, 196

(N) 196, 225

(3) `BĵU msL`vi gĵa` tKvbĵU eMĵtĵK 25 weĵqvM Kiĵ weĵqvMĵj GKĵU cYĵeMmsL`v nĵe?

(K) eomĵ

(L) tQvUĵU

(M) Dfquĵ

(N) GKĵU bv

4| wbĵPi Z` tĵv j Ĵ Ki :

i. 0.0001 Gi eMĵj 0.01

ii. $\frac{16}{225}$ GKĵU cYĵeMĵfMsk

iii. $\sqrt{3}$ Gi gvb cĵq 2 Gi mgvb

Dcĵi i Zĵ`i Avĵj vĵK wbĵPi tKvbĵU mĵVK?

(K) i l ii

(L) ii l iii

(M) i l iii

(N) i, ii l iii

5| GKRb KĵK evMvb Kivi Rb` 595ĵU Pvi vMvQ mĵb Avĵbb| cĵZ`KĵU Pvi vMvQĵi gĵ` 12 UvKv|

(K) Pvi vMvQ tĵv mĵbĵZ Zui KZ LiP ntĵĵQ?

(L) evMvĵb cĵZ`K mĵiĵZ mgvb msL`K MvQ j vMvĵbvi ci Kquĵ Pvi vMvQ Aemkó vKĵe?

(M) LiĵPi UvKvi msL`v l Pvi vMvQĵi msL`vi weĵqvMĵj i mvĵ tKvb Ĵĵ Zg msL`v thvM Kiĵ thvMĵj GKĵU cYĵeMmsL`v nĵe?

6| eMgij wbYq Ki :

(K) 0·36 (L) 2·25 (M) 0·0049 (N) 641·1024
(O) 0·000576 (P) 144·841225

7| `ß`kigK `vb chS-eMgij wbYq Ki :

(K) 7 (L) 23·24 (M) 0·036

8| wbtPi fMusk,tj vi eMgij wbYq Ki :

(K) $\frac{1}{64}$ (L) $\frac{49}{121}$ (M) $11\frac{97}{144}$ (N) $32\frac{241}{324}$

9| wZb`kigK `vb chS-eMgij wbYq Ki |

(K) $\frac{6}{7}$ (L) $2\frac{5}{6}$ (M) $7\frac{9}{13}$

10| 56728 Rb`mb` t`tk Kgct¶ KZRb`mb` mwi tq ivL,tj ev Zvt` i mvt_ Kgct¶ Avi KZRb`mb` thvM w` tj`mb`` j tk eM¶Kvti mrvvtbv hvte?

11| tKvtbv we`vj tqi 2704 Rb wk¶v_¶K cÖZ`wnK mgvtek Kivi Rb` eM¶Kvti mrvvtbv ntj v| cÖZ`K mwi tZ wk¶v_¶ msL`v wbYq Ki |

12| GKwU mgevq mwigZi hZRb m`m` wQj cÖZ`tk ZZ 20 UvKv Kti Pw`v t` l qvq tgvU 20480 UvKv ntj v | H mwigZi m`m`msL`v wbYq Ki |

13| tKvtbv evMvtb 1800 wU Pvi vMvQ eM¶Kvti j vMvtZ wMtq 36wU MvQ teik ntj v| cÖZ`K mwi tZ Pvi vMvtQi msL`v wbYq Ki |

14| tKvb ¶iz Zg cY`eM¶msL`v 9, 15 Ges 25 Øiv vefvR`?

15| GKwU avbt¶tZi avb KvUtZ kigK tbi qv ntj v| cÖZ`K kigtKi ``wbK gRyi Zvt` i msL`vi 10 _Y| ``wbK tgvU gRyi 6250 UvKv ntj kigtKi msL`v tei Ki |

16| `ßwU µwgK msL`vi e¶M¶ Ašt 37 ntj , msL`v `ßwU wbYq Ki |

17| Ggb`ßwU ¶iz Zg µwgK msL`v wbYq Ki hvte` i e¶M¶ Ašt GKwU cY`eM¶msL`v|

18| GKwU`mb`` j tk 5,6,9 mwi tZ mrvvtbv hvq, wKŠ`eM¶Kvti mrvvtbv hvq bv|

(K) 6 Gi _YbxqK,tj v tei Ki |

(L) `mb`msL`vtK tKvb ¶iz Zg msL`v Øiv _Y Ki tj`mb`msL`vtK eM¶Kvti mrvvtbv hvte?

(M) H`tj Kgct¶ KZRb`mb` thvM w` tj`mb`` j tk eM¶Kvti mrvvtbv hvte?

w0Zxq Aa"vq

Aa"vq tk†l wk v_xi v -

- 2.1 eûi wkk AbçvZ l avivewwK AbçvZ

$$\wedge^2 N^{\odot}, c_0^{\vee}, I, D^{\vee} PZ^{\vee} i, Ab_{c_1}^{\vee} Z = 8 : 5 : 6$$

GLt**b** wZbW i**w**ki Ab**c**vZ Dc⁻vcb Kiv n†qtQ| Gi**f**c wZb ev Z†Zwa**K** i**w**ki Ab**c**vZ†**K** eūi**w**kk Ab**c**vZ
e†j |

Ges $\frac{1}{10}Z \mid \text{`v`vi eqtmi AbjvZ} = 41 : 65$

̂B̂U AbĉvẐtK aviveŵnK AbĉvẐt ifĉvš̂t i Rb̂ ĉl̂g AbĉvẐt D̂Êi iwk̂ Ø̂viv ŵẐxq AbĉvẐt D̂f̂q
 iwk̂t̂K ̂Y Kît̂Ẑ n̂te Geŝ ŵẐxq AbĉvẐt cêŵiwk̂ Ø̂viv ĉl̂g AbĉvẐt D̂f̂q iwk̂t̂K ̂Y Kît̂Ẑ n̂te|

D`vni Y 1 | 7 : 5 Ges 8 : 9 `Bw AbcvZ | Gt`i tK avivewnK AbcvZ cKvk Ki |

mgvavb : 1g AbcvZ = 7 : 5

$$= \frac{7}{5}$$

$$= \frac{7 \times 8}{5 \times 8} = \frac{56}{40}$$

$$= 56 : 40$$

2q AbcvZ = 8 : 9

$$= \frac{8}{9}$$

$$= \frac{8 \times 5}{9 \times 5} = \frac{40}{45}$$

$$= 40 : 45$$

weKí mgvavb :

$$1g AbcvZ = 7 : 5 = 7 \times 8 : 5 \times 8 \\ = 56 : 40$$

$$2q AbcvZ = 8 : 9 = 8 \times 5 : 9 \times 5 \\ = 40 : 45$$

∴ AbcvZ `Bw avivewnK AbcvZ 56 : 40 : 45

KvR :

wbtPi AbcvZ , tjt vK avivewnK AbcvZ cKvk Ki :

1 | 12 : 17 Ges 5 : 12

2 | 23 : 11 Ges 7 : 13

3 | 19 : 25 Ges 9 : 17

2.2 mgvbcvZ

gtb Kwí , tmvnm tKvfbv t`vKv t`tK 10 UvKv w`tq GKw wPctmi c`vtKU Ges 25 UvKv w`tq 1 tKwR j eY wKbtjv | GLvfbv j eY I wPcm&Gi `vtgi AbcvZ = 25 : 10 ev 5 : 2 |

Avevi , tmvnm t`i tKvYtZ wKv`v msL`v 70 | Gt`i gta` QvT 50 Rb Ges QvT x 20 Rb | GLvfbv QvT I QvT xmsL`vi AbcvZ = 50 : 20 ev 5 : 2 | Dfqt`v AbcvZ `Bw mgvb |

AZGi , Avgiv ej tZ cwi , 25 : 10 = 50 : 20 | GB AbcvZ 4w iwK AvtQ |

Gi gta` 1g iwK 25, 2q iwK 10, 3q iwK 50 Ges 4_©iwK 20 wntmte wetePbv Ki tjt Avgiv wj LtZ cwi , 1g iwK : 2q iwK = 3q iwK : 4_©iwK |

Pviw iwki 1g I 2q iwki AbcvZ Ges 3q I 4_©iwki AbcvZ ci`ui mgvb ntj , iwK Pviw GKw mgvbcvZ `Zwi Kti | mgvbcvZi cZ`K iwktK mgvbcvZx etj |

mgvbcvZi 1g I 2q iwk mgRvZxq Ges 3q I 4_¶iwk mgRvZxq ntZ cvti |

A_¶ 4 ¶ iwk mgRvZxq nI qvi c¶qvRb tbB | c¶Z`K AbcvZi iwk `¶m mgRvZxq ntj B mgvbcvZ
^Zwi nq|

mgvbcvZi 1g I 4_¶iwk†K c¶šq iwk Ges 2q I 3q iwk†K ga` iwk etj | mgvbcvZ 0=0 ¶Ptýi
cwi etZ¶:0 ¶PýI e`envi Kiv nq| AZGe Avgiv wj LtZ cwi, 25 : 10 :: 50 : 20 |

Averi, 1g iwk : 2q iwk = 3q iwk : 4_¶iwk

$$\text{ev, } \frac{1g \text{ iwk}}{2q \text{ iwk}} = \frac{3q \text{ iwk}}{4_¶iwk} \quad \text{ev, } 1g \text{ iwk} \times 4_¶iwk = 2q \text{ iwk} \times 3q \text{ iwk}$$

j ¶ Kwi, mgvbcvZ hw` 2q iwk I 3q iwk mgvb nq, Zte $1g \text{ iwk} \times 4_¶iwk = (2q \text{ iwk})^2$

- mgvbcvZi 1g I 4_¶iwk†K c¶šq iwk etj |
- mgvbcvZi 2q I 3q iwk†K ga` iwk etj |

D`vniY 2 | 3, 6, 7 Gi 4_¶mgvbcvZx wby¶ Ki |

mgvavb : GLv†b 1g iwk 3, 2q iwk 6, 3q iwk 7

Avgiv Rwb, $1g \text{ iwk} \times 4_¶iwk = 2q \text{ iwk} \times 3q \text{ iwk}$

$$3 \times 4_¶iwk = 6 \times 7$$

$$\text{ev, } 4_¶iwk = \frac{2 \cancel{6} \times 7}{\cancel{3}_1} \quad \text{ev, } 14$$

wby¶ 4_¶mgvbcvZK 14

D`vniY 3 | 8, 7 Ges 14 Gi 3q iwk wby¶ Ki |

mgvavb : GLv†b 1g iwk 8, 2q iwk 7 Ges 4_¶iwk 14

Avgiv Rwb, $1g \text{ iwk} \times 4_¶iwk = 2q \text{ iwk} \times 3q \text{ iwk}$

$$\text{ev, } 8 \times 14 = 7 \times 3q \text{ iwk}$$

$$\begin{aligned} \therefore 3q \text{ iwk} &= \frac{8 \times 14^2}{\cancel{7}_1} \\ &= 16 \end{aligned}$$

KvR :

wb̄tPi Lw̄j Ni c̄iY Ki

(K) 9 :: 16 : 8(L) 9 : 18 :: 25 :

μwgK mgvbcvZ

ḡtb Kwi, 5 UvKv, 10 UvKv I 20 UvKv GB wZb̄w iwk̄ Øviv 5 : 10 Ges 10 : 20 GB w̄B̄w Ab̄cvZ
t̄bI qv n̄tj v| GLv̄tb, 5 : 10 :: 10 : 20| G ai t̄bi mgvbcvZt̄K μwgK mgvbcvZ etj | 5 UvKv, 10 UvKv I
20 UvKv t̄K μwgK mgvbcvZx etj |

wZb̄w iwk̄i 1g I 2q iwk̄i Ab̄cvZ Ges 2q I 3q iwk̄i Ab̄cvZ ci ūi mgvb n̄tj, mgvbcvZw̄t̄K μwgK
mgvbcvZ etj | iwk̄ wZb̄w t̄K μwgK mgvbcvZx etj | K : L :: L : M mgvbcvZw̄i wZb̄w iwk̄ K, L, M

μwgK mgvbcvZx n̄tj, $\frac{K}{L} = \frac{L}{M}$ ev $K \times M = (L)^2$ n̄t̄e| A_w̄, 1g I 3q iwk̄i „Ydj w̄Zxq iwk̄i et̄M̄P
mgvb|

j ̄I Kwi : • 2q iwk̄ t̄K 1g I 3q iwk̄i gā mgvbcvZx ev gā iwk̄ etj |
• μwgK mgvbcvZi wZb̄w iwk̄B mgRvZxq|

D̄vniY 4| GKw̄ μwgK mgvbcvZi 1g I 3q iwk̄ h_v̄μt̄g 4 I 16 n̄tj, gā mgvbcvZx I μwgK
mgvbcvZ w̄Ȳ̄ Ki |

mgvavb : Avgiv Rwb, 1g iwk̄ \times 3q iwk̄ = $(2q \text{ iwk̄})^2$

GLv̄tb, 1g iwk̄ = 4 Ges 3q iwk̄ = 16

$$\therefore 4 \times 16 = (gā \text{ iwk̄})^2$$

$$\therefore (gā \text{ iwk̄})^2 = 64$$

$$\therefore gā \text{ iwk̄} = \sqrt{64} = 8$$

w̄b̄t̄Ȳ̄ μwgK mgvbcvZ 4 : 8 :: 8 : 16 Ges w̄b̄t̄Ȳ̄ gā mgvbcvZx 8

^TiwkK

Avgiv Rwb, 1g iwk̄ \times 4_̄iwk̄ = 2q iwk̄ \times 3q iwk̄

ḡtb Kwi, 1g, 2q I 3q iwk̄ h_v̄μt̄g 9, 18, 20|

Zt̄e, $9 \times 4_iwk̄ = 18 \times 20$

$$\therefore 4_iwk̄ = \frac{2 \cancel{18} \times 20}{9 \cancel{1}} = 40$$

$$\therefore 4_iwk̄ = 40$$

Gf̄t̄e mgvbcvZi wZb̄w iwk̄ Rv̄v_v̄Kt̄j 4_̄iwk̄ w̄Ȳ̄ Kiv hv̄q| GB 4_̄iwk̄ w̄Ȳ̄ Kivi c̄xw̄Zt̄K
^TiwkK etj |

D`vniY 5 | 5wL LvZvi `vg 200 UvKv ntj , 7wL LvZvi `vg KZ?

mgvavb : GLvfb LvZvi msL`v evotj `vgl evote |

A_ŋ, LvZvi msL`vi AbjcvZ = LvZvi `vtgi AbjcvZ

$$5 : 7 = 200 \text{ UvKv} : 7wL \text{ LvZvi `vg}$$

$$\text{ev, } \frac{5}{7} = \frac{200 \text{ UvKv}}{7wL \text{ LvZvi `vg}}$$

$$\text{ev, } 7wL \text{ LvZvi `vg} = \frac{7 \times 200 \text{ UvKv}}{5} = 280 \text{ UvKv}$$

D`vniY 6 | 12 Rb tj vK GKwL KvR 9 w`b KiŋZ cviŋ | GKB nvŋi KvR Kiŋj 18 Rfb KvRwL KZ w`b KiŋZ cviŋ?

mgvavb : j ŋ Kwi , tj vKmsL`v evotj mgq Kg jwMte, Avevi tj vKmsL`v Kgŋj mgq teuk jwMte |

tj vKmsL`vi mij AbjcvZ mgŋqi e`-Abjcvŋi mgvb nte |

$$12 : 18 = wŋYŋ mgq : 9 w`b$$

$$\text{ev, } \frac{12^2}{18^3} = \frac{wŋYŋ mgq}{9 w`b}$$

$$\text{ev, } wŋYŋ mgq = \frac{2 \times 9^3}{3^4} w`b = 6 w`b$$

mgvbcvZK fvm

gfb Kwi , 500 UvKv 3 : 2 AbjcvŋZ eEb KiŋZ nte |

GLvfb 3 : 2 AbjcvŋZi ceŋwK I DĖi iwkŋi thvMdj = 3+2 = 5

$$\therefore 1g \text{ fvm} = 500 \text{ UvKv} \frac{3}{5} \text{ Ask} = 300 \text{ UvKv}$$

$$\text{Ges } 2q \text{ fvm} = 500 \text{ UvKv} \frac{2}{5} \text{ Ask} = 200 \text{ UvKv}$$

AZGe, GKwL Aŋki cvi gvY = cĖ Ė iwk $\times \frac{H \text{ Aŋki AvjcvZK msL`v}}{\text{AbjcvŋZi ceŋ DĖi iwkŋi thvMdj}}$
Gfŋte Dcŋi i c \times wŋZŋ GKwL iwkŋK wvfb fvm wv³ Kiv hvq |

GKwL cĖ Ė iwkŋK GKwaK wv³ msL`vi AbjcvŋZ wv³ KivŋK mgvbcvZK fvm etj |

D`vniY 7 | 20 wgvvi KvcoŋK wZb fvBtevb AwgZ, mggZ I `PwZi gŋa` 5 : 3 : 2 AbjcvŋZ fvm Kiŋj cĖZ`ŋKi Kvcoŋi cvi gvY KZ ?

mgvavb : Kvctoi cwi gvY = 20 wglvi

c0 Ē AbcvZ = 5 : 3 : 2

AbcvZi msL`v,tjvi thvMdj = 5+3+2 = 10

∴ AwgtZi Ask = 20 wglvti i $\frac{5}{10}$ Ask = 10 wglvi

mggtZi Ask = 20 wglvti i $\frac{3}{10}$ Ask = 6 wglvi

Ges `PwZi Ask = 20 wglvti i $\frac{2}{10}$ Ask = 4 wglvi

AwgZ, mggZ I `PwZi Kvctoi cwi gvY h_vµtg 10 wglvi, 6 wglvi I 4 wglvi |

KvR :

1| K : L = 4 : 5, L : M = 7 : 9 ntj , K : L : M wbyq Ki |

2| 4800 UvKv Avtqkv, wdtivRv I Lw`Rvi gta` 4 : 3 : 1 AbcvZ fvm Kti w`tj tK KZ UvKv cvte ?

3| wZbRb Qvti i gta` 570 UvKv Zvt` i eqtmi AbcvZ fvm Kti t` lqv ntj v| Zvt` i eqm h_vµtg 10, 13 I 15 eQi ntj , tK KZ UvKv cvte?

D`vniY 8| cwti I Zctbi Avtqi AbcvZ 4 : 3 | Zcb I iwetbi Avtqi AbcvZ 5 : 4 | cwti i Avq 120 UvKv ntj , iwetbi Avq KZ?

mgvavb : cwti I Zctbi Avtqi AbcvZ 4 : 3 = $\frac{4}{3} = \frac{4 \times 5}{3 \times 5} = \frac{20}{15} = 20 : 15$

Zcb I iwetbi Avtqi AbcvZ $\frac{5}{4} = \frac{5 \times 3}{4 \times 3} = \frac{15}{12} = 15 : 12$

cwti i Avq : Zctbi Avq : iwetbi Avq = 20 : 15 : 12

∴ cwti i Avq : iwetbi Avq = 20 : 12

ev, $\frac{\text{cwti i Avq}}{\text{iwetbi Avq}} = \frac{20}{12}$

ev, iwetbi Avq = $\frac{\text{cwti i Avq} \times 12}{20}$ UvKv
 $= \frac{120 \times 12}{20}$ UvKv ev 72 UvKv |

∴ iwetbi Avq 72 UvKv

Abkxj bx 2.1

1| wbtPi i wk, tj v w` tq mgvbcvZ tj L :

(K) 3 tKwR, 5 UvKv, 6 tKwR, 10 UvKv

(L) 9 eQi, 10 w`b, 18 eQi I 20 w`b

(M) 7 tm.wg., 15 tm.tKÛ, 28 tm.wg. I 1 wgwbu

(N) 12wU LvZv, 15wU tcvYj, 20 UvKv I 25 UvKv

(O) 125 Rb QvÎ I 25 Rb wk¶K, 2500 UvKv I 500 UvKv

2| wbtPi µwgK mgvbcvZi cÖšxq i wk `BwU t` I qv AvtQ | mgvbcvZ `Zwi Ki :

(K) 6, 24 (L) 25, 81 (M) 16, 49 (N) $\frac{5}{7}, 1\frac{2}{5}$ (O) 1.5, 13.5 |

3| kb`wb ctiY Ki :

(K) 11 : 25 :: : 50 (L) 7 : :: 8 : 64 (M) 2.5 : 5.0 :: 7 :

(N) $\frac{1}{3} : \frac{1}{5} :: \frac{\quad}{\quad} : \frac{7}{10}$ (O) : 12.5 :: 5 : 25

4| wbtPi i wk, tj vi 4_ mgvbcvZx wby¶ Ki :

(K) 5, 7, 10 (L) 15, 25, 33 (M) 16, 24, 32

(N) 8, $8\frac{1}{2}$, 4 (O) 5, 4.5, 7

5| 15 tKwR Pwtj i `vg 600 UvKv ntj, Gi jc 25 tKwR Pwtj i `vg KZ ?

6| GKwU Mwtg¶Um d`v±wi tZ `wbK 550 wU kvU©`Zwi nq | H d`v±wi tZ GKB nvti 1 mBvtn KZWU kvU©`Zwi nq ?

7| Kwei mvtntei wZb c¶fi eqm h_vµtg 5 eQi, 7 eQi I 9 eQi | wZwb 4200 UvKv wZb c¶tK Zvt` i eqm AbcvtZ fvM Kti w` tj b, tK KZ UvKv cvte ?

8| 2160 UvKv i fvg, tRmrgb I KvKwj i gta` 1 : 2 : 3 AbcvtZ fvM Kti w` tj tK KZ UvKv cvte?

9| wKQyUvKv j wee, mwig I wmqvg Gi gta` 5 : 4 : 2 AbcvtZ fvM Kti t` I qv ntj v | wmqvg 180 UvKv tctj j wee I mwig KZ UvKv cvte wby¶ Ki |

- 10| meR , $\text{Wwj g l wj sKb wZb fvB}$ | $\text{Zvt`i wcZv 6300 UvKv Zvt`i gta` fWM Kti w`tj b}$ | GtZ meR
 $\text{Wwj tgi } \frac{3}{5} \text{ Ask Ges Wwj g wj sKtbi } \text{w}_Y \text{ UvKv cvq}$ | $\text{cZ`tKi UvKvi cwi grY tei Ki}$ |
- 11| $\text{Zvgv, `v l ifcv wgwktq GK i Ktgi Mnbv `Zwi Kiv ntj v}$ | $\text{H Mnbvq Zvgv l `v AbcvZ } 1 : 2$
 $\text{Ges `v l ifcvi AbcvZ } 3 : 5$ | $19 \text{ M} \text{g l Rtbi Mnbvq KZ M} \text{g ifcv AvtQ?}$
- 12| $\text{`BwU mgvb gvtci Mm kietZ cYAvtQ}$ | $\text{H kietZ cwb l wmitci AbcvZ h_vmtg c} \text{g Mtm } 3 :$
 $2 \text{ l wZxq Mtm } 5 : 4$ | $\text{H `BwU Mtm kietZ GKt` wgy Ki t j cwb l wmitci AbcvZ wby} \text{g}$
 Ki |
- 13| $\text{K : L} = 4 : 7$, $\text{L : M} = 10 : 7$ ntj , $\text{K : L : M wby} \text{g Ki}$ |
- 14| $9600 \text{ UvKv mvi v, gvbgn l ivBmvi gta` } 4 : 3 : 1$ $\text{AbcvZ fWM Kti w`tj tK KZ UvKv cte}$?
- 15| $\text{wZbRb Qvt`i gta` } 4200 \text{ UvKv Zvt`i tk} \text{Y AbcvZ fWM Kti t` l qv ntj v}$ | $\text{Zviv hw` h_vmtg } 6\delta$,
 $7\text{g l } 8\text{g tk} \text{Yi w} \text{Yv_nq, Zte tK KZ UvKv cte}$?
- 16| $\text{tmvj vqgvb l mvj gvtbi Avtqi AbcvZ } 5 : 7$ | $\text{mvj gvb l BDMtdi Avtqi AbcvZ } 4 : 5$ |
 $\text{tmvj vqgvbi Avq } 120 \text{ UvKv ntj BDMtdi Avq KZ?}$

2.3 j vf-ՊԿԶ

$\text{GKRb t`vKvb`vi } 1 \text{ WRb ej tcb } 60 \text{ UvKv } \mu\text{q Kti } 72 \text{ UvKv wemq Ki t j b}$ | $\text{GLvtb t`vKvb`vi } 12\text{w}$
 $\text{ej tcb } 60 \text{ UvKv } \mu\text{q Ki t j b}$ | $\text{dtj } 1\text{w ej tcbi } \mu\text{qgj` } \frac{60}{12} \text{ UvKv ev } 5 \text{ UvKv}$ | $\text{Avevi wZwb } 12\text{w ej tcb}$
 $72 \text{ UvKv wemq Ki t j b}$ | $\text{dtj } 1\text{w ej tcbi wemqgj` } \frac{72}{12} \text{ UvKv ev } 6 \text{ UvKv}$ |
 $1\text{w ej tcbi } \mu\text{qgj` } 5 \text{ UvKv l wemqgj` } 6 \text{ UvKv}$ |
 $\text{tKvtbn wRwb th g t j` } \mu\text{q Kiv nq, ZvtK } \mu\text{qgj` Ges th g t j` wemq Kiv nq, ZvtK wemqgj` et j}$ |
 $\mu\text{qgj` i tPtq wemqgj` temk ntj, j vf nq}$ |
 $\text{j vf} = \text{wemqgj`} - \mu\text{qgj`} = 6 \text{ UvKv} - 5 \text{ UvKv} \text{ ev } 1 \text{ UvKv}$ |
 $\text{GLvtb t`vKvb`vi cZwU ej tcb } 1 \text{ UvKv Kti j vf Ki t j b}$ |
 $\text{Avevi gtb Kwi, GKRb Kj wetmZv } 1 \text{ nwj Kj v } 20 \text{ UvKv } \mu\text{q Kti } 18 \text{ UvKv wemq Ki t j b}$ | $\mu\text{qgj` i}$
 $\text{tPtq wemqgj` Kg ntj, ՊԿԶ ev t j vKmb nq}$ |
 $\text{ՊԿԶ} = \mu\text{qgj`} - \text{wemqgj`} = (20 - 18) \text{ UvKv}$
 $= 2 \text{ UvKv}$
 $\text{GLvtb Kj wetmZv cZ nwj tZ } 2 \text{ UvKv Kti ՊԿԶ Ki t j b}$ |

D`vniY 9| GKRB Kgj wepmZv cŁZkZ Kgj v 1000 UvKvq wKtb 1200 UvKvq wepq Ki tjb| Zwi KZ jvf ntjv?

mgvavb : 100wU Kgj vi μqgj` 1000 UvKv

100wU 0 wepmqgj` 1200 0

GLvfb μqgjtj`i tPtq wepmqgj` tewk nI qvq jvf ntqtQ|

A_ŕ, jvf = wepmqgj` – μqgj`

= 1200 UvKv – 1000 UvKv

= 200 UvKv

wbtYŕ jvf 200 UvKv|

D`vniY 10| GKRB t`vKvb`vi 50 tKwRi 1 e`vPvj 1600 UvKvq wKbtjb| Pvtj i `vg Ktg hvl qvq 1500 UvKvq wepq Ktib, Zwi KZ ŕwZ ntjv?

mgvavb : GLvfb, 1 e`vPvtj i μqgj` 1600 UvKv

Ges 1 0 0 wepmqgj` 1500 0

∴ μqgjtj`i tPtq wepmqgj` Kg nI qvq ŕwZ ntqtQ|

∴ ŕwZ = μqgj` – wepmqgj`

= 1600 UvKv – 1500 UvKv = 100 UvKv

wbtYŕ ŕwZ 100 UvKv|

D`vniY 11| 75 UvKvq 15wU ej tcb wKtb 90 UvKvq wepq Ki tjb kZKiv KZ jvf nte?

mgvavb : GLvfb, 15wU ej tcbi μqgj` 75 UvKv

Ges 15wU 0 wepmqgj` 90 UvKv

μqgjtj`i tPtq wepmqgj` tewk nI qvq jvf ntqtQ|

∴ jvf = wepmqgj` – μqgj`

= 90 UvKv – 75 UvKv = 15 UvKv

∴ 75 UvKvq jvf nq 15 UvKv

1 0 0 0 $\frac{15}{75}$ 0

∴ 100 0 0 0 $\frac{15 \times 100}{75}$ 0 ev 20 UvKv

AZGe jvf 20%|

D`vniY 12 | GKRb gvQweթմZv cՕZ nwy Bj k gvQ 1600 UvKv ԽԷb cՕZւ gvQ 350 UvKv Kti weթ Kiti b | Zwi kZKiv KZ jvf ev ՊԽ ntjv ?

mgvavb : cՕZ nwy ev 4ւ Bj tki `vg = 1600 UvKv

$$\therefore 1ւ \quad 0 \quad 0 = \frac{400}{41} \frac{1600}{41} UvKv = 400 UvKv$$

Averi, 1ւ Bj tki weթggj` 350 UvKv

GLԷb, թggj`i tPtq weթggj` Kg nI qvq ՊԽ ntqժ |

$$\therefore \text{ՊԽ} = \text{թggj`} - \text{weթggj`} \\ = 400 UvKv - 350 UvKv = 50 UvKv$$

\therefore 400 UvKv ՊԽ nq 50 UvKv

$$1 \quad 0 \quad 0 \quad 0 \quad \frac{50}{400} \quad 0 \\ \therefore 100 \quad 0 \quad 0 \quad 0 \quad \frac{50^{25} \times 100^1}{400^{42}} \quad 0 \quad \text{ev} \quad \frac{25}{2} UvKv \quad \text{ev} \quad 12 \frac{1}{2} UvKv$$

$$\therefore \text{ՊԽ} \quad 12 \frac{1}{2} \%$$

D`vniY 13 | GKeւ. Av½j 2750 UvKv weթ Kivq 450 UvKv ՊԽ ntjv | H Av½j 3600 UvKv weթ Kiti KZ jvf ev ՊԽ ntZv?

mgvavb : Av½ti i weթggj` = 2750 UvKv

$$\text{ՊԽ} = 450 UvKv$$

$$\text{թggj`} = 3200 UvKv$$

Averi, weթggj` = 3600 UvKv

$$\text{թggj`} = 3200 UvKv$$

$$\text{jvf} = 400 UvKv$$

$$\therefore \text{jvf} \quad 400 UvKv |$$

D`vniY 14 | GKRb Pv e`emvqx GKeւ. Pv cvZv tKւR cՕZ 80 UvKv ԽԽԷ թq Kiti b | me Pv cvZv tKւR cՕZ 75 UvKv `ti weթ Kivq 500 UvKv ՊԽ nq | ԽԽԷ KZ tKւR Pv cvZv թq Kiti ժtj b?

մղված : 1 ԿՐ ԸԸՄ Ս՝ ԸՄԸՄ ԸԸԸՄ 80 ԱՄԿ

0 0 0 0 ԸԸԸԸՄ 75 ԱՄԿ

∴ 1 ԿՐ Ս՝ ԸՄԸՄ ԸԸԸՄ ԸԸՄ ԸԸՄ 5 ԱՄԿ

∴ 5 ԱՄԿ ԸԸՄ ԸԸՄ 1 ԿՐԸՄ

1 0 0 0 $\frac{1}{5}$ 0

500 0 0 0 $\frac{1 \times 500^{100}}{5}$ 0

= 100 ԿՐԸՄ

∴ Ս՝ ԸՄԸՄ ԸԸՄ ԸԸՄ ԸԸՄ 100 ԿՐ

Ը՝ՎԻԸ 15 | ԸԸԸՄ ԸԸԸԸՄԸՄ ԸԸՄ ԸԸԸՄ ԸԸՄ 101 ԱՄԿ ՝ Ը 5 ԸԸԸ ԸԸՄ 90 ԱՄԿ ՝ Ը 6 ԸԸԸ ԸԸՄ ԸԸԸՄ ԸԸՄ ՝ Ը ԸԸԸՄ ԸԸՄ ԸԸՄ ԸԸՄ 3 ԱՄԿ յ՝ Ը՝ Ը՝ ?

մղված : 1 ԸԸԸ ԸԸԸՄ ԸԸԸՄ 101 ԱՄԿ

∴ 5 0 0 0 101 × 5 ԱՄԿ Ը՝ 505 ԱՄԿ

Ա՝ՎԻ, 1 ԸԸԸ ԸԸԸՄ ԸԸԸՄ 90 ԱՄԿ

∴ 6 0 0 0 90 × 6 ԱՄԿ Ը՝ 540 ԱՄԿ

∴ (5+6) ԸԸԸ Ը՝ 11 ԸԸԸ ԸԸԸՄ ԸԸԸՄ (505 + 540) ԱՄԿ Ը՝ 1045 ԱՄԿ

∴ 1 0 0 0 $\frac{1045}{11}$ ԱՄԿ Ը՝ 95 ԱՄԿ

Ը՝ 1 ԸԸԸ ԸԸԸՄ ԸԸԸՄ 95 ԱՄԿ

ԸԸԸ ԸԸՄ 3 ԱՄԿ յ՝ Ը՝ 1 ԸԸԸ ԸԸԸՄ ԸԸԸՄ (95 + 3) ԱՄԿ Ը՝ 98 ԱՄԿ

∴ ԸԸՄ ԸԸԸ ԸԸԸՄ ԸԸԸՄ 98 ԱՄԿ յ՝ ԸԸՄ ԸԸՄ 3 ԱՄԿ յ՝ Ը՝ Ը՝

Ը՝ՎԻԸ 16 | ԸԸՄ ԸՄԸ 10% ԸԸԸԸՄ ԸԸԸՄ ԸՍՄ յ՝ ԸԸԸՄ 450 ԱՄԿ ԸՍՄ յ՝ 5% յ՝ Ը՝ ԸՍՄ ԸՍՄ ԸԸՄ ԸԸՄ ?

մղված : ԸՍՄ ԸՍՄ, ԸՄԸ ԸՍՄ ԸԸԸՄ 100 ԱՄԿ

10% ԸԸԸԸՄ ԸԸԸՄ (100 - 10) ԱՄԿ Ը՝, 90 ԱՄԿ

5% յ՝ Ը՝ ԸԸԸՄ (100 + 5) ԱՄԿ = 105 ԱՄԿ

5% j vtf weµqgj – 10% ¶wZtZ weµqgj

$$= (105 - 90) \text{ UvKv ev, } 15 \text{ UvKv}$$

∴ weµqgj 15 UvKv temk ntj µqgj 100 UvKv

$$1 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad \frac{100}{15} \quad 0$$

$$\therefore 450 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad 0 \quad \frac{100 \times 450^{30}}{15_1} \quad 0$$

$$= 3000 \text{ UvKv}$$

QvMj wli µqgj 3000 UvKv

D`vniY 17| bwej wgwó i t`vKvb t`tk 250 UvKv `ti 2 tKwR mtk`k µq Ki tj v| f`vUi nvi 4 UvKv ntj , mtk`k µq eve` tm t`vKwbtk KZ UvKv t`te?

mgvavb : 1 tKwR mtk`tki `vg 250 UvKv

$$\therefore 2 \quad 0 \quad 0 \quad 0 \quad (250 \times 2) \text{ UvKv}$$

$$= 500 \text{ UvKv}$$

100 UvKvq f`vU 4 UvKv

$$\therefore 1 \quad 0 \quad 0 \quad \frac{4}{100} \quad 0$$

$$\therefore 500 \quad 0 \quad 0 \quad \frac{4 \times 500^5}{100_1} \quad 0 = 20 \text{ UvKv}$$

∴ bwej mtk`k µq eve` t`vKwbtk t`te (500 + 20) UvKv ev 520 UvKv|

j ¶Yxq : tKvfbv `te`i µqgj`i mvf_ wlv` 8 nvfi c0vbKZ Ki tk f`vU (VAT) etj |

- KvR : 1| KYv kwó i t`vKvb wMtq 1,200 UvKvq GKw wmtéi kwó l 1,800 UvKvq GKw w`tcm µq Ki tj v| f`vUi nvi 4 UvKv ntj , tm t`vKwbtk KZ UvKv t`te?
- 2| BkivK gwbnwi t`vKvb wMtq GK WRb tcbwµj µq Kti t`vKwbtk 250 UvKv w`j | f`vUi nvi 4 UvKv ntj , c0Zw tcbwµj i `vg KZ?

D`vniY 18| bwmi mvfntei gj teZb 27,650 UvKv| ewl R tgvU Avtqi c0g GK j ¶ Awk nvRvfi AvqKi 0 (kb`) UvKv| cieZP UvKi Dci AvqKti i nvi 10 UvKv ntj , bwmi mvfne KZ UvKv AvqKi t`b?

mgvavb : 1 gvtmi gj teZb 27,650 UvKv

$$\therefore 12 \ 0 \ 0 \ 0 \ (27,650 \times 12) \text{ UvKv} \\ = 3,31,800 \text{ UvKv}$$

\therefore Ki thvM' UvKvi cwi gvY (3,31,800 – 1,80,000) UvKv ev 1,51,800 UvKv

100 UvKvq AvqKi 10 UvKv

$$\therefore 1 \ 0 \ 0 \ \frac{10}{100} \ 0$$

$$\therefore 1,51,800 \ 0 \ 0 \ \frac{10 \times \overset{1,51,8}{1,51,800}}{100_1} \ 0 \text{ ev } 15,180 \text{ UvKv}$$

\therefore bwni mvne 15,180 UvKv AvqKi t' b|

D`vniY 19| c0xc tMwmi GKrb e`emvqx| e`emvqK c0qvRtb ZwtK cw_exi wefboet`tk agY Ki tZ nq| dtj ZwtK mv_ Kti BDGm Wj vi wbtq thtZ nq| hw` 1 BDGm Wj vi = 81.50 UvKv nq Ges Zwi hw` 7000 Wj vi c0qvRb nq, Zte evsj vt`wk KZ UvKv j vMte?

mgvavb : 1 BDGm Wj vi 81.50 UvKv

$$7000 \ 0 \ 0 \ 81.50 \times 7000 \text{ UvKv} \\ = 5,70,500.00 \text{ UvKv}$$

wbtYq UvKvi cwi gvY = 5,70,500 UvKv|

Abkxj bx 2.2

- 1| GKrb t`vKvb`vi c0Z wguvi 200 UvKv `ti 5 wguvi Kvro wKtb c0Z wguvi 225 UvKv `ti wepq Kitj KZ jvf ntqtQ?
- 2| GKrb Kgj wetpZv c0Z nwj 60 UvKv `ti 5 WRb Kgj v wKtb c0Z nwj 50 UvKv `ti wepq Kitj KZ qwZ ntqtQ?
- 3| iwe c0Z tKwR 40 UvKv `ti 50 tKwR Pvdj wKtb 44 UvKv tKwR `ti wepq Kitj KZ jvf ev qwZ nte?
- 4| c0Z wj Uvi wgevfUv `ja 52 UvKvq wKtb 55 UvKv `ti wepq Kitj kZKiv KZ jvf nq?

- 5| cŰZw PKtj U 8 UvKv wntmte mq Kti 8-50 UvKv wntmte wemq Kti 25 UvKv j vf ntj v, tgvU Kqwl PKtj U mq Kiv ntqwlQj ?
- 6| cŰZ wglvi 125 UvKv `ti Kico mq Kti 150 UvKv `ti wemq Kiti t`vKvb`v`ti 2000 UvKv j vf nq| t`vKvb`vi tgvU KZ wglvi Kico mq KtiwQtb?
- 7| GKw `e` 190 UvKvq mq Kti 175 UvKvq wemq Kiti kZKiv KZ j vf ev ŦwZ nte ?
- 8| 25 wglvi Kico th gtb` mq Kti, tmB gtb` 20 wglvi Kico wemq Kiti kZKiv KZ j vf ev ŦwZ nte ?
- 9| 5 UvKvq 8w Avgj wK mq Kti 5 UvKvq 6w `ti wemq Kiti kZKiv KZ j vf ev ŦwZ nte ?
- 10| GKw Mmwi wemqgj` Mmwi muqgtj`i $\frac{4}{5}$ Astki mgvb| kZKiv j vf ev ŦwZ wYŦ Ki |
- 11| GKw `e` 400 UvKvq wemq Kiti hZ ŦwZ nq 480 UvKvq wemq Kiti, Zvi wZb,Y j vf nq| `e`wli muqgtj` wYŦ Ki |
- 12| GKw Nw 625 UvKvq wemq Kiti 10% ŦwZ nq| KZ UvKvq wemq Kiti 10% j vf nte ?
- 13| gvbKv 20 UvKv `ti 15 wglvi j vj wdzv mq Kiti v| f`vUi nvi 4 UvKv| tm t`vKvb`K 500 UvKvi GKw tlvU w`j | t`vKvb Zv`K KZ UvKv tdiZ t`teb|
- 14| w. ivq GKRb mi Kvix KgRZŦ wZwb Zx`vb cwi`kŦbi Rb` fvi`Z h`teb| hw` evsj v`wk 1 UvKv mgvb fvi Zxq 0.63 ific nq, Zte fvi Zxq 3000 ifici Rb` evsj v`tki KZ UvKv cŰqvRb nte ?
- 15| bxwj g GKRb PrKwi Rxw| Zui gwmK gtbZb 22,250 UvKv| ewl R tgvU Av`qi cŰg GK j Ŧ Awk nrv`ti AvqKi 0 (kb`) UvKv| cieZŦUvKvi Dci AvqKti i nvi 10 UvKv ntj bxwj g Ki eve` KZ UvKv cwi`kva Ktib?

2.4 MwZ wel qK mgm`v

w`i cwb`Z tbŠKvi MwZteM ntj v Gi cŰZ MwZteM| t`vZw`bx b`xtZ tbŠKv th MwZteM Ptj Zv tbŠKvi KvRix MwZteM| t`vZi AbKtb Ptj tbŠKvi cŰZ MwZteMi mv` t`vZi teM thvM Kti KvRix MwZteM tei Kiv nq| Avei t`vZi cŰZKtb Ptj tbŠKvi cŰZ teM t`K t`vZi teM wetqvM Kti tbŠKvi KvRix teM wYŦ Kiv nq|

AZGe, t`vZi AbKtb tbŠKvi KvRix MwZteM = tbŠKvi cŰZ MwZteM + t`vZi MwZteM|

t`vZi cŰZKtb tbŠKvi KvRix MwZteM = tbŠKvi cŰZ MwZteM - t`vZi MwZteM|

$$\begin{aligned}
 & \text{U'v\wui} \frac{1}{200} \text{ Ask cwb cY\h{q} 1 wgbtU} \\
 \therefore & \begin{array}{ccccc} 0 & 1 & 0 & 0 & 0 \end{array} \frac{1 \times 200}{1} \text{ wgbtU} \\
 & = 200 \text{ wgbU} = 3 \text{ N\text{E}v 20 wgbtU}
 \end{aligned}$$

wbtYq mgq 3 N\text{E}v 20 wgbU |

D`vniY 22 | 60 wguvi `xN©GKwU tU\bi MwZteM N\text{E}vq 48 wK.wg. | tijjvB\bi cvtki GKwU LjUtK AwZµg Ki\Z tUbwU KZ mgq jvMte ?

mgvarb : LjUw AwZµg Ki\Z tUbwUtK wbtRi ^\tNq mgvb `iZi AwZµg Ki\Z nte |

48 wK.wg. = 48 × 1000 wguvi ev 48000 wguvi

tUbwU 48000 wg. AwZµg Kti 1 N\text{E}vq

$$\begin{array}{ccccc} 0 & 1 & 0 & 0 & 0 \end{array} \frac{1}{48000} \text{ N\text{E}vq ev } \frac{1 \times 60 \times 60}{48000} \text{ tm\text{t}Kt\text{U}}$$

$$\begin{array}{ccccc} 0 & 60 & 0 & 0 & 0 \end{array} \frac{1 \times 60 \times 60^3 \times 60^3}{48000 \cancel{8} \cancel{4} \cancel{2}} \text{ tm\text{t}Kt\text{U}}$$

$$= \frac{9}{2} \text{ tm\text{t}Kt\text{U}}$$

$$= 4 \frac{1}{2} \text{ tm\text{t}Kt\text{U}}$$

tUbwU $4 \frac{1}{2}$ tm\text{t}Kt\text{U} LjUw AwZµg Ki\te |

Abkxj bx 2.3

1 | 5 : 4 Ges 6 : 7 Gi avivewnK AbjcvZ tKvbUw ?

(K) 24 : 30 : 28

(L) 30 : 24 : 28

(M) 28 : 24 : 30

(N) 24 : 28 : 30

2 | GKwU µwgK mgvbcv\Zi 1g l 3q iwk h_vµtg 4 l 25 ntj , ga" mgvbcvZx tKvbUw ?

(K) 8

(L) 50

(M) 10

(N) 20

3 | 3, 5, 15-Gi PZL mgvbcvZx tKvbUw ?

(K) 20

(L) 25

(M) 10

(N) 35

4| GKRb t`vKvb`vi GKwU w`qvkj vB e- 1.50 UvKvq μq Kti 2.00 UvKvq weμq Kitj Zwi kZKiv KZ jvf nte ?

(K) 20%

(L) 15%

(M) 25%

(N) $33\frac{1}{3}\%$

5| GKRb Kj weμZv cōZ nvwj Kj v 25 UvKv `ti μq Kti cōZ nvwj 27 UvKv `ti weμq Kitj , Zwi 50 UvKv jvf nq| tm KZ nvwj Kj v μq KtiwQj ?

(K) 25 nvwj

(L) 20 nvwj

(M) 50 nvwj

(N) 27 nvwj

6| wbtPi iwk,tjv`vM tUt b wj Ki :

(K) μqgj` weμqgj`i tPtq tewk ntj

(K) Kg j vtM

(L) μqgj` weμqgj`i tPtq Kg ntj

(L) j vf nq

(M) t`tZi AbKtj mgq

(M) tewk j vtM

(N) t`tZi cōZKtj mgq

(N) ¶wZ nq

7| 5 Rb kōgK 6 w`tb 8 weNv Rwgj dmj DWtZ cvi | 20 weNv Rwgj dmj DWtZ 25 Rb kōgK KZ w`b j vMte?

8| `cb GKwU KvR 24 w`tb KitZ cvi | iZb D³ KvR 16 w`tb KitZ cvi | `cb I iZb GKtI KvRwU KZ w`tb tkl KitZ cvi te?

9| nweev I nvwj gv GKwU KvR GKtI 20 w`tb KitZ cvi | nweev I nvwj gv GKtI 8 w`b KvR Kivi ci nweev Ptj tMj | nvwj gv ewk KvR 21 w`tb tkl Kij | muY[©]KvRwU nvwj gv KZ w`tb KitZ cvi Z?

10| 30 Rb kōgK 20 w`tb GKwU ewo `Zwi KitZ cvi | KvR i`i 10 w`b cti Lvi v Avnvl qvi Rb` 6 w`b KvR eU i vLtZ ntqtQ| wbaWi Z mgtq KvRwU tkl KitZ AwZwi ³ KZRb kōgK j vMte?

11| GKwU KvR K I L GKtI 16 w`tb, L I M GKtI 12 w`tb Ges K I M GKtI 20 w`tb KitZ cvi | K, L I M GKtI KvRwU KZ w`tb KitZ cvi te?

12| GKwU tPŠev`Pvq `BwU bj AvtQ| cōg I wZxq bj Øviv h_vμtg 12 NÈv I 18 NÈvq Lwj tPŠev`PwU cY`nq| `BwU bj GK mvτ_ Ltj w`tj Lwj tPŠev`PwU KZ NÈvq cY`nte?

13| t`tZi AbKtj GKwU tbŠKv 4 NÈvq 36 wK.wg. c_ AwZμg Kti | t`tZi teM cōZNÈvq 3 wK.wg. ntj , w`i cwbtZ tbŠKvi teM KZ?

- 14| t̄t̄Zi cōZKt̄j GKw Rvnr 11 NĒvq 77 wK.wg. c_ AwZμg Kti | w̄i cwb̄t̄Z Rvnr̄Ri MwZteM cōZNĒvq 9 wK.wg. nt̄j , t̄t̄Zi MwZteM cōZNĒvq KZ?
- 15| `uo tet̄q GKw t̄bŠKv t̄t̄Zi AbKt̄j 15 wgv̄b̄t̄U 3 wK.wg. Ges t̄t̄Zi cōZKt̄j 15 wgv̄b̄t̄U 1 wK.wg. c_ AwZμg Kti | w̄i cwb̄t̄Z t̄bŠKv I t̄t̄Zi MwZteM w̄bYq̄ Ki |
- 16| GKRb K.I.K 5 t̄Rvov Mi“ Øviv 8 w̄t̄b 40 tn̄i Rwg Pvl Kīt̄Z cv̄tib | wZwb 7 t̄Rvov Mi“ Øviv 12 w̄t̄b KZ tn̄i Rwg Pvl Kīt̄Z cv̄iteb?
- 17| wj wj GKv GKw Kvr 10 NĒvq Kīt̄Z cv̄tib | wgwj GKv H Kvrw 8 NĒvq Kīt̄Z cv̄tib | wj wj I wgwj GKt̄I H Kvrw KZ NĒvq Kīt̄Z cv̄iteb?
- 18| `Bw bj Øviv GKw Lwj t̄Pšev“Pv h_v̄μt̄g 20 wgv̄b̄t̄U I 30 wgv̄b̄t̄U cwb-cY©Kiv hvq | t̄Pšev“PwL Lwj _vKv Ae~vq `Bw bj GK mv̄t̄_ Lt̄j t̄I qv nt̄j v | cōg bj w KLb eÜ Kīt̄j t̄Pšev“PwL 18 wgv̄b̄t̄U cwb-cY©h̄te?
- 19| 100 wgv̄vi `xN©GKw t̄Ūt̄bi MwZteM NĒvq 48 wKt̄j wgv̄vi | H t̄Ūw 30 tm̄t̄Kt̄Ü GKw tm̄Zi AwZμg Kti | tm̄Zwi `N©KZ?
- 20| 120 wgv̄vi `xN©GKw t̄Ub 330 wgv̄vi `xN©GKw tm̄Zi AwZμg Kite | t̄Ūw MwZteM NĒvq 30 wK.wg. nt̄j , tm̄Zi AwZμg Kīt̄Z t̄Ūw KZ mgq j vM̄te?
- 21| Rvmg mv̄t̄ne GKRb K>Ūt̄i | wZwb 2 wK.wg. iv~v-30 w̄t̄b 2 j ŋ UvKvq t̄giv̄t̄Zi Rb“ Kvr t̄ct̄j b | wZwb GB Kvrw Kivi Rb“ 20 Rb kōgK w̄t̄qM w̄t̄j b | wKŠ' 12 w̄b ci Lvivc Avenl qvi Kvīt̄Y Z̄t̄K 4 w̄b Kvr eÜ tīt̄L ew̄K Kvr t̄kl Kīt̄Z nt̄j v | Kvr t̄kt̄l t̄Lv t̄Mj 2,25,000 UvKv LiP nt̄j v | GgZve~vq w̄t̄Pi cōk̄t̄j vi DĒi `vl :
- (K) 12 w̄t̄b iv~vi kZKiv KZ Ask m̄úb̄t̄q̄Qj ?
- (L) w̄b̄ ̄ ̄ mḡt̄q ew̄K Kvr Kivq AwZwi ³ KZ Rb kōgK t̄j t̄M̄Qj ?
- (M) AwZwi ³ kōgKmsL̄v cōĒ kōgK msL̄vi kZKiv KZ?
- (N) Kvrw m̄úb̄Kivq Zwi kZKiv KZ ŋwZ nt̄j v?

cwi gvc

``bwb Rxeftb Avgiv newfbaeKvfti i tfvM" cY" e"envi Kwi hvi gta" AvtQ Pvj , Wvj , wPwb, j eY, dj gj ,
 `p, ^Zj, cwlb BZ"wb | e"emwqK l e"enwi K tftt G,tj vi cwigvc c0qvRb nq| cteP tk0vtZ Avgiv
 ^^N©, l Rb, tftt dj l mgq cwigvtci aviYv tctqW| ^^N©ev `tZj cwigvc Kivi Rb" Avgiv GKUv wbw`0
 gvtci ^^tN© mvft_ Gi Zj bv Kwi | Zij e"ZxZ Ab"vb" `e" l Rb w`tq cwigvc KitZ nq| wKš' Zij
 c`vt_ P tKvftbv AvKvi tbB| GwJ gvcvi Rb" wbw`0 AvKvfti gvcwb e"envi Kiv nq| G Aa"vtq ^^N©,
 tftt dj , l Rb l Zij c`vt_ P AvqZb cwigvtci nek` Avtj vPbv Kiv ntqtQ|

Aa"vq tk‡l wk¶v_xl v-

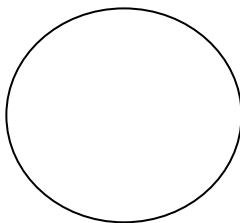
- ~N°cwi gvtci AvštmꞑúK°ēvL̄v Ges G mspμš-mgm̄v mgvarb KițZ cvi țe|
- I Rb I Zij c`vt_Ⓟ AvqZb cwigvc Kxfvț Kiv nq Zv eˊvL̄v KițZ cvi țe Ges G mꞑúmkZ mgm̄v mgvarb KițZ cvi țe|
- t̄j eˊenvi Kti AvqZrvki I emKvi t̄t̄i i ~N°I cŏ'cwigvc Kti t̄t̄dj wYq̄ KițZ cvi țe|
- I Rb cwigvtci wewfbcwivic eˊenvi Kti `ēw̄i I Rb cwigvc KițZ cvi țe|
- Zij c`vt_Ⓟ AvqZb cwigvtci wewfbcwivic eˊenvi Kti thtKvțbv Zij c`vt_Ⓟ cwigvc KițZ cvi țe|
- ~bw`b Rxetb AvbgwbK cwigvc KițZ cvi țe|

3.1 $\hat{N}^{\text{Cwi gvc}}$

Avgiv evRvti wltq Kvrco, e`jwZK Zvi, iwk BZ`w` wKtb _wK| GKUv wlv`0 gvtci `tNq mvt_ Zj bv Kti G_ujv mq-wemq nq| Avevi ewmo ntZ `g, evRvi ev t÷kb KZ `t Zv-I Avgvt`i Rvbi c0qrBb nq| GB `tZj Avgiv H wlv`0 gvtci `tNq mvt_ Zj bv Kti tei Kwi| GB `NqK cwigvtci GKK ejv nq|

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	5				4	3				2		1		

weLUK c×uZtZ ^N© cwi gvtci GKK wntmte MR, dU, BwÂ Pjy AvtQ| eZgvtb cw_extZ AwaKvsk t`tk
^N© cwi gvc wntmte eëüZ nt"Q tguUK c×uZ| cw_exi Dëi tgi" t_tK dtYi ivRavbx c`wi tmi `wNgv
eivei weLptiLv chS-^tN© tKwUfvMi GKfvMtK 1 wguvi wntmte MY" Kiv nq| tguUK c×uZtZ ^N©
cwi gvtci GKK nt"Q wguvi |



cəwɪʊbvg I Bwi wqvg avZi msɪgkɪY ʔZwi wɪʊtɪi Avmj bgɪv cɪlexi me tʔtki Rbʔ Avʔkʰev ÷ vʊwʰ
iʃc MYʔ Kiv nq| Gwɪ dɪtʔYi hvʔNti msiwɪZ i tʔtQ| wɛwfbɛtʔtki cʊqvRɪb Avʔkʰbgɪv tʔtK ʔvɪxq
bgɪv ʔZwi Kti tɪl qv nq|

1 wɪʊvi = Dɛi tgiʔ tʔtK wɛɪtɪLv chʰtɪgɪv ʔtʔZi 1 tKwɪ fvɪMi 1 fvM

j ʔ Kwi, 1982 mvj tʔtK evsj vʔtki meʔ ʔʔ Nʰgɪcvi Rbʔ, I Rb wɪYɪqi Rbʔ Ges Zij cʔvʔʔ AvqZb
cwi gɪtci Rbʔ ʊAvʂRʱZK Avʔkʰvɔ ev ʊmtʔ ÷ g Ae Bʊvi bʔvkvj BDwɪʊ MʰY Kiv ntʔtQ|
ʔʔ Nʰcwi gɪtci GKKvɛvj

tɪwɪK cɪwɪZ		wɛɪwɪK cɪwɪZ	
10 wɪwɪj wɪʊvi (wɪ.wɪ.)	=	1 tɪwɪwɪʊvi (tɪm. wɪ.)	12 BwĀ = 1 dɪ
10 tɪwɪwɪʊvi	=	1 tʔwɪwɪʊvi (tʔwɪm. wɪ.)	3 dɪ = 1 MR
10 tʔwɪwɪʊvi	=	1 wɪʊvi (wɪ.)	1760 MR = 1 gvBj
10 wɪʊvi	=	1 tʔwɪwɪʊvi (tʔwɪv. wɪ.)	
10 tʔwɪwɪʊvi	=	1 tɪtʔwɪʊvi (tɪn. wɪ.)	
10 tɪtʔwɪʊvi	=	1 wɪKtʔj wɪʊvi (wɪK. wɪ.)	

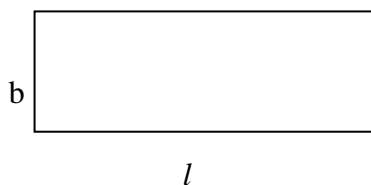
tɪwɪK I wɛɪwɪK cwi gɪtci mɪʊKʰ

1 BwĀ	=	2.54 tɪm. wɪ. (cʊq)
1 gvBj	=	1.61 wɪK. wɪ. (cʊq)
1 wɪʊvi	=	39.37 BwĀ (cʊq)
1 wɪK. wɪ.	=	0.62 gvBj (cʊq)

- KvR : 1| ʔʔ bʱb Rɛtɪb eʔeʊZ nq ev KvR j vʔM Ggb wɪKʰyeʔi bvg Ki, hvʔi ʔʔ Nʰcwi gɪc Ki tʔZ nq|
2| tʔj wʔtʔ tʔZvgvi GKwɪ eBtʔi I tʔwɛtʔj i ʔʔ NʰI cʊʔ BwĀtʔZ Ges tɪwɪwɪʊvi gɪc| G ntʔZ 1 BwĀ
mgvb KZ tɪwɪwɪʊvi Zv wɪYɪqi Ki|
3| gɪcvi wɪZv wʔtʔ tʔwɪYKtʔʔi ʔʔ NʰI cʊʔ cwi gɪc Ki|

wbtp KtqKwU t¶¶t i t¶¶t d t j i m t t l qv n t j v :

AvqZ



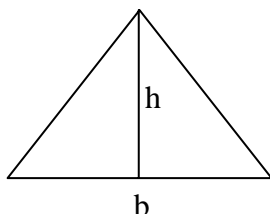
$$\begin{aligned} t¶¶t d j &= \text{''} N^{\circ} \times c\text{' } \\ &= l \times b \end{aligned}$$

mgvšwi K



$$\begin{aligned} t¶¶t d j &= f_{wg} \times D^{\circ} PZv \\ &= l \times h \end{aligned}$$

wl fR



$$\begin{aligned} t¶¶t d j &= \frac{1}{2} \times f_{wg} \times D^{\circ} PZv \\ &= \frac{1}{2} \times (b \times h) \end{aligned}$$

t¶¶t d j cwi gv t c t gwUK l weUK c×wZi mæúK©

weUK c×wZtZ

1 eMBwÄ	= 6.45 eMfmwUwgUvi (cŕq)
1 eMeU	= 929 eMfmwUwgUvi (cŕq)
1 eMR	= 0.84 eMŕgUvi (cŕq)

vbxq c×wZtZ

1 eMfmwUwgUvi	= 0.155 eMBwÄ (cŕq)
1 eMŕgUvi	= 10.76 eMeU (cŕq)
1 tn±i	= 2.47 GK i (cŕq)

KvR :

- 1| t j w t q t Zvgvi GKwU eBtqi l covi tUetj i '' N° t m w UwgUvi t g t c Gi t¶¶t d j w b Yŕ Ki |
- 2| j MZfvte t Zvgiv teÄ, tUej , i Rv, Rvbvj v BZ'w i '' N° l cŕ' t d j i m v n v t h t g t c t¶¶t d j tei Ki |

3.3 l Rb cwi gvc

cŕZ'K e i l Rb AvtQ | wevfba t k wevfba GKt Ki m v n v t h e i l Rb Kiv n q |

l Rb cwi gv t c i t gwUK GKKvej

10 wgvj Mŕg (wg. Mŕ.)	=	1 t m w U Mŕg (t m. Mŕ.)
10 t m w U Mŕg	=	1 t W m Mŕg (t W m Mŕ.)
10 t W m Mŕg	=	1 Mŕg (Mŕ.)
10 Mŕg	=	1 t W K v Mŕg (t W K v Mŕ.)

10 tWkvMög	=	1 tn±vMög (tn. MÖ.)
10 tn±vMög	=	1 wKtj vMög (tK. wR.)
100 wKtj vMög (tK. wR.)	=	1 KB>Uvj
1000 wKtj vMög ev 10 KB>Uvj	=	1 tgvUK Ub

I Rb cwi gv̄ci GKK : MÖg

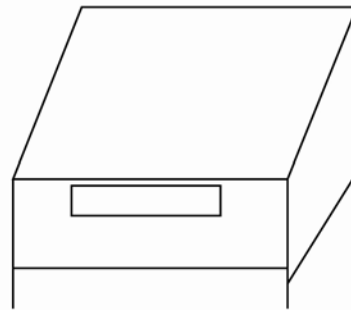
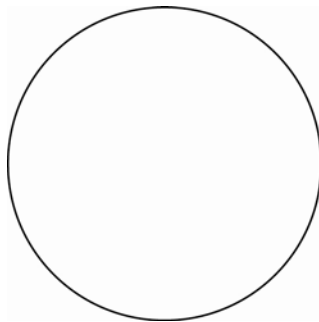
1 wKtj vMög ev 1 tK.wR. = 1000 MÖg

4⁰ tmj wmqvm Zvcgv̄vq 1 Nb tm. wg. w̄ei × cwi bi I Rb 1 MÖg |

tgvUK c×wZtZ I Rb cwi gv̄ci Rb̄ ēeüZ Av̄I | B̄w GKK Av̄Q | Aw̄K cwi gv̄Y ēi I R̄bi Rb̄ G
B̄w GKK ēenvi Kiv nq | GKK B̄w nt̄Q KB>Uvj I tgvUK Ub |

kn̄ti I MÖg I Rb cwi gv̄ci Rb̄ w̄ocvj øv I evULviv ēenvi Kiv nq | G evULviv 5 MÖg, 10 MÖg, 50
MÖg, 100 MÖg, 200 MÖg, 500 MÖg, 1 tK. wR., 2 tK. wR., 5 tK. wR., 10 tK. wR. BZ̄w̄ I R̄bi nq |

ĀbK t̄t̄ kn̄ti w̄MKvUv ēv̄tj Ÿ øviv I Rb cwi gv̄c Kiv nq | Gw̄ t̄L̄tZ ĀbKuvB GKw̄ Kw̄Z
w̄ciwḡWi w̄b̄Pi Āt̄ki ḡZv hvi D̄ci w̄ē ivLv hvq Ges hvi M̄tq GKcv̄k t̄qvj N̄w̄i W̄qv̄tj i w̄v̄Mi
ḡZv t̄Mvj v̄Kvi tiLvq w̄M KvUv v̄t̄K | I R̄bi mgn̄v̄i w̄Ktj vM̄tgi gv̄c w̄v̄Mi cv̄k msL̄v emv̄bv v̄t̄K
Ges N̄w̄i w̄gn̄b̄Ui KuUvi ḡZv GKUv w̄b̄R̄K KuUv v̄t̄K | ḡvcvi Rb̄ ēv̄tj t̄Ÿi D̄ci t̄Kv̄bv w̄ē emv̄tj B
KuUw̄ th msL̄v̄t̄K w̄b̄R̄ K̄ti tm msL̄v̄B H ēi I Rb |
ḠtZ c̄ōZ t̄K. wR. t̄K 10 f̄v̄M f̄v̄M K̄ti w̄M KvUv Av̄Q |



eZ̄gv̄b w̄MKvUv ēv̄tj Ÿ Gi t̄tj w̄w̄RUvj ēv̄tj Ÿ ēeüZ nt̄Q | Gw̄ GKw̄ t̄Qv̄ ev̄t̄ i ḡZv hvi M̄tq GK
cv̄k msL̄v̄q M̄tgi I Rb c̄ōw̄kZ nq | Gi m̄vn̄v̄h̄ w̄ēi gj̄ I w̄b̄Ȳqi ēēv̄ Av̄Q | KviY GB ēv̄tj t̄Ÿ
K̄vj K̄tj Ut̄i i m̄ȳeav̄l v̄t̄K | c̄ōZ w̄Ktj vM̄g w̄ēi gj̄ ḡvb w̄tq c̄ōw̄kZ msL̄v̄t̄K K̄vj K̄tj Ut̄i i w̄b̄q̄t̄g Ÿ
Kītj B̄ w̄ēi t̄gv̄U gj̄ cv̄l qv̄ hvq | G Rb̄ GB ēv̄tj Ÿ ēenvi Kiv m̄ȳeav̄R̄bK | Z̄t̄e t̄ēk cwi gv̄Y w̄ē
I Rb KītZ GL̄bl w̄ocvj øv ēenvi Kiv nq |

KvR : `j xqfite `wocvj øv A_ev wvWvRvUvj e`vtj Y e`envi Kti t`j, cy`K, wvWvbet. i l Rb cwi gvc Kti tgvWvK c×wvZtZ tj L|

3.4 Zij c`vt_ P AvqZb cwi gvc

tKvfbv Zij c`v_ KZUv RvqMv Rfo _vtK Zv Gi AvqZb|

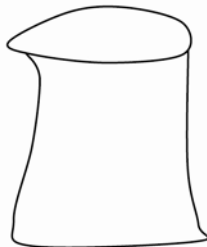
GKwv Nbe`i ``N°, cØ', D`PZv AvtQ| wvKŠ' tKvfbv Zij c`vt_ P Zv tbB| th cvtÎ ivLv nq tmB cvtÎ i AvKvi aviY Kti | G Rb` wvWv` Ø AvqZtbi tKvfbv Nbe`i AvKwvZi gvcwb Øviv Zij c`v_ gvcv nq| G

t¶tÎ Avgiv mvaviYZ wj Uvi gvcwb e`envi Kwi | G gvcwb ,tj v $\frac{1}{4}, \frac{1}{2}, 1, 2, 3, 4, \dots$ BZ`w` wj Uvi wvWvKó

Gj wgvbqvq ev wvWv wvKv Øviv `Zwi GK cKvti i tKvbK AvKwvZi cvÎ ev wvWv Uvi AvKwvZi gM| Avevi `^Q KvPi `Zwi 25, 50, 100, 200, 300, 500, 1000 wgvw wj Uvi `vMKvUv Lvov cvÎ l e`envi Kiv nq| mvaviYZ `p l `Zj gvcvi t¶tÎ Dvj øwvZ cvÎ ,tj v e`envi Kiv nq|



1 wj Uvi gvcwb

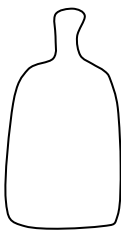


1 wj Uvi `vM KvUv gM wPÎ

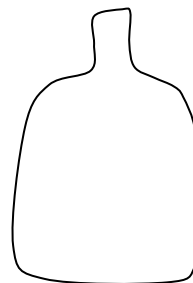


1 M`vj b

tµZv-wetµZvi mveavt_ eZgvtb tfvR`tZj tevZj RvZ Kti wvWv nt`Q| G t¶tÎ 1, 2, 5 l 8 wj Uvti i tevZj wvWv e`eüZ nq| wvWvfbecKvti i cvbxq 250, 500, 1000, 2000 wgvw wj Uvi ev Ab`vb` AvqZtbi tevZj RvZ Kti wvWv Kiv nq|



1 wj Uvi tevZj



5 wj Uvi tevZj wPÎ

1 Nb tmwUvgUvi tK mst¶t c Bsti wvRtZ wv. wv. (Cubic Centimetre) tj Lv nq|

1 Nb tm.wg. (wv.wv.) = 1 wgvw wj Uvi

1 Nb BwÂ = 16.39 wgvw wj Uvi (cØq)

AvqZb cwi gvtc tguUK GKKvej

1000 Nb tmbUgUvi (Nb tm. wg.)	=	1 Nb tWmugUvi (N. tWmug.)
1000 Nb tWmugUvi	=	1 Nb wgUvi (N. wg.)
1000 Nb tmbUgUvi	=	1 wj Uvi
1 wj Uvi cmbi I Rb	=	1 wKtj vMg

KvR :

- 1| GKwU cvbxqRtj i cvtT i avi YqIgZv KZ vm. vm. Zv cwi gvc Ki |
- 2| wkTK KZR wbañi Z ARvbn AvqZtbi GKwU cvtT i AvqZb Abgvb Ki | Zvi ci Gi mWK AvqZb tei Kti ftj i cwi gvY wbYq Ki |

D`vniY 1| 16 GKi RwtZ 420 tguUK Ub Avj yDrcbontj , 1 GKi RwtZ Kx cwi gvY Avj yDrcbontj ?

mgvavb : 16 GKi RwtZ Drcbontj 420 tguUK Ub Avj y

$$\therefore 1 \quad 0 \quad 0 \quad 0 \quad 0 \quad \frac{420}{16} \quad 0 \quad 0 \quad 0$$

$$= 26 \frac{1}{4} \text{ tg. Ub } \text{ ev } 26 \text{ tguUK Ub } 250 \text{ tKwR Avj y}$$

$$1 \text{ tg. Ub} = 1000 \text{ tKwR}$$

\therefore 1 GKti Avj y Drcv`b 26 tguUK Ub 250 tKwR |

D`vniY 2| ivqnvb GK GKi RwtZ avb Pvl Kti 400 tKwR avb tctqtQ | cñZ tKwR avtb 700 Mg Pvj ntj , tm Kx cwi gvY Pvj tcj ?

mgvavb : 1 tK. wR. avtb Pvj nq 700 Mg

$$\therefore 400 \quad 0 \quad 0 \quad 0 \quad 700 \times 400 \quad 0 \\ = 280000 \text{ Mg} \\ = 280 \text{ tKwR}$$

\therefore cñB Pvtj i cwi gvY 280 tKwR |

D`vniY 3| GKwU tgvUi Mmo 10 wj Uvi wWtRtj 80 wKtj wgUvi hvq | 1 wKtj wgUvi thtZ Kx cwi gvY wWtRtj i cñqvRb ?

mgvavb : 80 wKtj wgUvi hvq 10 wj Uvi wWtRtj

$$\therefore 1 \quad 0 \quad 0 \quad \frac{10}{80} \quad 0 \quad 0 = \frac{1000}{8} \text{ wgvj wj Uvi } \text{ ev } 125 \text{ wgvj wj Uvi wWtRtj}$$

\therefore cñqvRbxq wWtRtj i cwi gvY 125 wgvj wj Uvi |

D`vniY 4 | GKwU wî fRvKvi fvgi ^N°6 wguvi | D"PZv 4 wguvi | wî fRvKvi tñîwui tñîdj KZ ?

$$\begin{aligned} \text{mgvarb : wî fRvKvi tñîwui tñîdj} &= \frac{1}{2} \times (\text{fvg} \times \text{D"PZv}) \\ &= \frac{1}{2} \times (6 \times 4) \text{ eMguvi} = 12 \text{ eMguvi} \end{aligned}$$

∴ wî fRvKvi tñîwui tñîdj 12 eMguvi |

D`vniY 5 | GKwU wî fRvKwZ Rvgi tñîdj 216 eMguvi | Gi fvg 18 wguvi ntj , D"PZv wbyq Ki |

mgvarb : Avgiv Rwb,

$$\begin{aligned} \frac{1}{2} \times \text{fvg} \times \text{D"PZv} &= \text{wî fRi tñîdj} \\ \text{ev, } \frac{1}{2} \times 18 \text{ wguvi} \times \text{D"PZv} &= 216 \text{ eMguvi} \\ \text{ev, } 9 \text{ wguvi} \times \text{D"PZv} &= 216 \text{ eMguvi} \\ \text{ev, } \text{D"PZv} &= \frac{216}{9} \text{ wguvi ev } 24 \text{ wguvi} \end{aligned}$$

∴ D"PZv 24 wguvi |

D`vniY 6 | cwmn GKwU cKti i ^N°80 wguvi | cõ' 50 wguvi | hw cKti cõZ`K ctoi w`wi 4 wguvi nq, Zte cKi ctoi tñîdj KZ?

mgvarb :

$$\begin{aligned} \text{cro et` cKti i } ^N^{\circ} &= \{80 - (4 \times 2)\} \text{ wguvi} \\ &= 72 \text{ wguvi} \end{aligned}$$

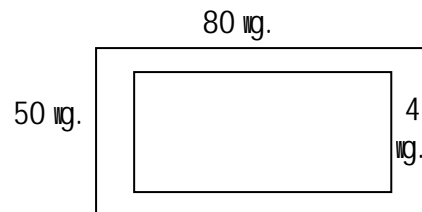
$$\begin{aligned} \text{cro et` cKti i cõ'} &= \{50 - (4 \times 2)\} \text{ wguvi} \\ &= 42 \text{ wguvi} \end{aligned}$$

$$\begin{aligned} \text{GLb cwmn cKti i tñîdj} &= (80 \times 50) \text{ eMguvi} \\ &= 4000 \text{ eMguvi} \end{aligned}$$

$$\begin{aligned} \text{Ges cro et` cKti i tñîdj} &= (72 \times 42) \text{ eMguvi} \\ &= 3024 \text{ eMguvi} \end{aligned}$$

$$\begin{aligned} \therefore \text{cKi ctoi tñîdj} &= (4000 - 3024) \text{ eMguvi} \\ &= 976 \text{ eMguvi} | \end{aligned}$$

∴ cKi ctoi tñîdj 976 eMguvi |



Abkxj bx 3

- 1| wKtj wglviti cKvk Ki :
(K) 40390 tm. wg. (L) 75 wglvi 250 wg. wg.
- 2| 5.37 tWkwglviti K wglvi I tWmwglviti cKvk Ki :
- 3| wbtP KtqKw w fRvKvi tqt i fng I D"PZv t I qv ntj v| w fRvKvi tqt i tqt dj wYq Ki :
(K) fng 10wg. I D"PZv 6 wg. |
(L) fng 25 tm .wg. I D"PZv 14 tm. wg. |
- 4| GKw AvqZvKvi tqt i N° c i 3 Y| Gi Pwi w tK Gkevi c wY Ki tj 1 wKtj wglvi nuUv nq| AvqZvKvi tqt i N° I c wY Ki |
- 5| cZ wglvi 100 UvKv t i 100 wglvi j t I 50 wglvi Pl ov GKw AvqZvKvi cvtK Pwi w tK teov w tZ KZ LiP j wte ?
- 6| GKw mvgvšw K tqt i fng 40 wglvi I D"PZv 50 wglvi | Gi tqt dj wY Ki |
- 7| GKw NbtKi GKviti i N° 4 wglvi | NbKw Zj tj vi tqt dj wY Ki |
- 8| thvmd Zwi GK LE RgtZ 500 tK. wR. 700 Mlg Avj yDrcv b Kti b| wZwb GKB tqt dj wkwó 11 LE RgtZ Kx cwi gvY Avj yDrcv b Kti b ?
- 9| cti tki 16 GKi RgtZ 28 tglwK Ub avb DrcbentqtQ| Zwi cZ GKi RgtZ Kx cwi gvY avb ntqtQ ?
- 10| GKw w-j wgtj GK gvtm 20000 tglwK Ub iW Zwi nq| H wgtj wK Kx cwi gvY iW Zwi nq ?
- 11| GK e'emvqx tKvbtv GKw b 20 tK. wR. 400 Mlg Wvj wep q Kti b| G wnmvte Kx cwi gvY Wvj wZwb GK gvtm wep q Kti b ?
- 12| GKw RgtZ 20 tK. wR. 850 Mlg mwi lv Drcbentj , Abje 7 Ld RgtZ tglv Kx cwi gvY mwi lv Drcbente ?
- 13| GKw gtMi wfZti i AvqZb 1.5 wj Uvi ntj , 270 wj Uviti KZ gM cw b nte ?
- 14| GK e'emvqx tKvbtv GKw b 18 tK. wR. 300 Mlg Pvj Ges 5 tK. wR. 750 Mlg j eY wep q Kti b| G wnmvte gvtm wZwb Kx cwi gvY Pvj I j eY wep q Kti b ?
- 15| tKvbtv cwi evti wK 1.25 wj Uvi t j vM| cZ wj Uvi t ai vg 52 UvKv ntj , H cwi evti 30 w tZ KZ UvKvi t j wte ?
- 16| GKw AvqZvKvi eMvbi N° I c h_vptg 60 wglvi , 40 wglvi | Gi wfZti PZy K 2 wglvi Pl ov iv vAvtQ| iv wUti tqt dj wY Ki |
- 17| GKw Nti i N° c i 3 Y| cZ eMvUviti 7.50 UvKv t i Nti i tgtS Kvtc w t q gptZ tglv 1102.50 UvKv e q nq| Ni wUti N° I c wY Ki |

PZ_L ©Aa"vq

exRMwYZxq iwiki „Y I fvM

MwYtZi PviwU tgšwj K cōμqv ntjv thvM, wētvM, „Y I fvM | wētvM nt"Q thvMi wēcixZ cōμqv Avi fvM nt"Q „tYi wēcixZ cōμqv | cwiUMwYtZ tKej abvZK wPyhy³ msL"v ē"envi Kiv nq | wKŠ' exRMwYtZ abvZK I FYvZK Dfq wPyhy³ msL"v Ges msL"vmPK cZxKI ē"envi Kiv nq | Argiv lō tkwYtZ wPyhy³ iwiki thvM-wētvM Ges exRMwYZxq iwiki thvM I wētvM mātÜ avi Yv tctqQ | G Aa"vtq wPyhy³ iwiki „Y I fvM Ges exRMwYZxq iwiki „Y I fvM cōμqv mātÜ Avtj vPbv Kiv ntqtQ |

Aa"vq tktI wk¶v_¶v –

- exRMwYZxq iwiki „Y I fvM KitZ cvi te |
- eÜbx ē"enviti i gva"tg exRMwYZxq iwiki thvM, wētvM, „Y I fvM msμvš-`bμ`b Rxeṭbi mgm"vi mgvavb KitZ cvi te |

4.1 exRMwYZxq iwiki „Y

„tYi wēlbgq wēa :

Argiv Rwb, $2 \times 3 = 6$, Avevi $3 \times 2 = 6$

∴ $2 \times 3 = 3 \times 2$, hv „tYi wēlbgq wēa |

GKBfvte, a, b thtKvṭbv `BwU exRMwYZxq iwiki ntj, $a \times b = b \times a$ A_¶, My" I MytKi "vb wēlbgq Kitj, „Ydtj i tKvṭbv cwi eZB nq bv |

„tYi msthvM wēa :

$(2 \times 3) \times 4 = 6 \times 4 = 24$; Avevi, $2 \times (3 \times 4) = 2 \times 12 = 24$

∴ $(2 \times 3) \times 4 = 2 \times (3 \times 4)$, hv „tYi msthvM wēa |

GKBfvte, a, b, c thtKvṭbv wZbwU exRMwYZxq iwiki Rb"

$(a \times b) \times c = a \times (b \times c)$, hv „tYi msthvM wēa |

4.2 wPyhy³ iwiki „Y

Argiv Rwb, 2 tK 4 evi wbtj $2 + 2 + 2 + 2 = 8 = 2 \times 4$ nq | GLvṭb ejv hvq th, 2 tK 4 Øiv „Y Kiv ntqtQ |

A_¶, $2 \times 4 = 2 + 2 + 2 + 2 = 8$

thtKvfbv exRMwZxq i wk a l b Gi Rb"

$$\boxed{a \times b = ab} \dots\dots\dots (i)$$

Averi , $(-2) \times 4 = (-2) + (-2) + (-2) + (-2) = -8 = -(2 \times 4)$

A_ŕ , $(-2) \times 4 = -(2 \times 4) = -8$

mvavi Yfvte, $\boxed{(-a) \times b = -(a \times b) = -ab} \dots\dots\dots (ii)$

Averi , $a \times (-b) = (-b) \times a$, ŕYi wnbqg wwa

$$= -(b \times a)$$

$$= -(a \times b)$$

$$= -ab$$

A_ŕ , $\boxed{a \times (-b) = -(a \times b) = -ab} \dots\dots\dots (iii)$

mZi vs, $(-a) \times (-b) = -\{(-a) \times b\}$ [(iii) Abhvqx]

$$= -\{-(a \times b)\}$$
 [(ii) Abhvqx]
$$= -(-ab)$$

$$= a \times b$$
 [$\because -x$ Gi thwMvZK weci xZ x]
$$= ab$$

A_ŕ , $\boxed{(-a) \times (-b) = ab} \dots\dots\dots (iv)$

j ¶ Kwí :

- * GKB wPyh³ `Bw i wki ŕYdj (+) wPyh³ nte|
- * weci xZ wPyh³ `Bw i wki ŕYdj (-) wPyh³ nte|

$(+1) \times (+1)$	$=$	$+1$
$(-1) \times (-1)$	$=$	$+1$
$(+1) \times (-1)$	$=$	-1
$(-1) \times (+1)$	$=$	-1

ŕYi mPK wwa :

Avgi v Rwb, $a \times a = a^2$, $a \times a \times a = a^3$, $a \times a \times a \times a = a^4$

$\therefore a^2 \times a^4 = (a \times a) \times (a \times a \times a \times a) = a \times a \times a \times a \times a \times a = a^6 = a^{2+4}$

mvavi Yfvte, $\boxed{a^m \times a^n = a^{m+n}}$ m, n thtKvfbv ŕfwieK mSL v|

GB c¶uqtK ŕYi mPK wwa ej v nq|

Averi , $(a^3)^2 = a^3 \times a^3 = a^6 = a^{3 \times 2} = a^6$

mvavi Yfvte, $\boxed{(a^m)^n = a^{mn}}$

„tYi eEb wea

$$\begin{aligned} \text{Avgiv Rwb, } 2(a+b) &= (a+b) + (a+b) [\because 2x = x + x] \\ &= (a+a) + (b+b) \\ &= 2a + 2b \end{aligned}$$

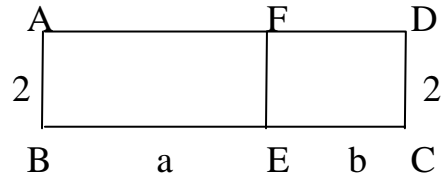
Avevi cvtki wPÎ nZ cvB,

$ABEF$ AvqZtqÎw i tÎdj

$$= \text{N}^\circ \times \text{c}^\circ = BE \times AB = a \times 2 = 2 \times a = 2a$$

Avevi, $ECDF$ AvqZtqÎw i tÎdj = $\text{N}^\circ \times \text{c}^\circ$

$$= EC \times CD = b \times 2 = 2 \times b = 2b$$



$\therefore ABCD$ AvqZtqÎw i tÎdj

$= ABEF$ AvqZtqÎw i tÎdj + $ECDF$ AvqZtqÎw i tÎdj

$$= 2a + 2b$$

Avevi, $ABCD$ AvqZtqÎw i tÎdj

$$= \text{N}^\circ \times \text{c}^\circ$$

$$= BC \times AB$$

$$= AB \times (BE + EC)$$

$$= 2 \times (a + b) = 2(a + b)$$

$$\therefore 2(a+b) = 2a + 2b.$$

mvavi Yfvte, $m(a+b+c+\dots\dots\dots) = ma + mb + mc + \dots\dots\dots$

GB wbggtK „tYi eEb wea ej v nq|

4.3 GKc`x iwk tK GKc`x iwk Øviv ,Y

„Bw GKc`x iwiki „tYi tÎtÎ Zvt`i mvsL`K mnMØqtK wPyhy³ msL`vi „tYi wbggtg ,Y Ki tZ nq|

Dfqct` we`gvb exRMWZxq cZxK,tj vtK mPK wbggtg ,Y Kti ,Ydtj wj LtZ nq| Ab`vb` cZxK,tj v

Acwi ewZZ Ae`vq ,Ydtj tbi qv nq|

D`vniY 1| $5x^2y^4$ tK $3x^2y^3$ Øviv ,Y Ki |

$$\begin{aligned} \text{mgvavb} : & 5x^2y^4 \times 3x^2y^3 \\ = & (5 \times 3) \times (x^2 \times x^2) \times (y^4 \times y^3) \\ = & 15x^4y^7 \quad [\text{mPK } \text{wbqg } \text{Abjvqx}] \end{aligned}$$

wb†Yq ,Ydj $15x^4y^7$.

D`vniY 3| $-7a^2b^4c$ tK $4a^2c^3d$ Øviv ,Y Ki |

$$\begin{aligned} \text{mgvavb} : & (-7a^2b^4c) \times 4a^2c^3d \\ = & (-7 \times 4) \times (a^2 \times a^2) \times b^4 \times (c \times c^3) \times d \\ = & -28a^4b^4c^4d \end{aligned}$$

wb†Yq ,Ydj $-28a^4b^4c^4d$.

D`vniY 2| $12a^2xy^2$ tK $-6ax^3b$ Øviv ,Y Ki |

$$\begin{aligned} \text{mgvavb} : & 12a^2xy^2 \times (-6ax^3b) \\ = & 12 \times (-6) \times (a^2 \times a) \times b \times (x \times x^3) \times y^2 \\ = & -72a^3bx^4y^2 \end{aligned}$$

wb†Yq ,Ydj $-72a^3bx^4y^2$.

D`vniY 4| $-5a^3bc^5$ tK $-4ab^5c^2$ Øviv ,Y Ki |

$$\begin{aligned} \text{mgvavb} : & (-5a^3bc^5) \times (-4ab^5c^2) \\ = & (-5) \times (-4) \times (a^3 \times a) \times (b \times b^5) \times (c^5 \times c^2) \\ = & 20a^4b^6c^7 \end{aligned}$$

wb†Yq ,Ydj $20a^4b^6c^7$.

KvR : 1| ,Y Ki :

(K) $7a^2b^5$ tK $8a^5b^2$ Øviv

(L) $-10x^3y^4z$ tK $3x^2y^5$ Øviv

(M) $9ab^2x^3y$ tK $-5xy^2$ Øviv

(N) $-8a^3x^4by^2$ tK $-4abxy$ Øviv

4.4 euc`x iwk†K GKc`x iwk Øviv ,Y

euc`x iwk†K GKc`x iwk Øviv ,Y Ki†Z ntj ,†Y'i (cŭg iwk) cŭZ`K c`†K ,YK (wŶZxq iwk) Øviv ,Y Ki†Z nq|

D`vniY 5| $(5x^2y + 7xy^2)$ tK $5x^3y^3$ Øviv ,Y Ki |

$$\begin{aligned} \text{mgvavb} : & (5x^2y + 7xy^2) \times 5x^3y^3 \\ = & (5x^2y \times 5x^3y^3) + (7xy^2 \times 5x^3y^3) \quad [\text{eEb } \text{wewa } \text{Abjv†i}] \\ = & (5 \times 5) \times (x^2 \times x^3) \times (y \times y^3) + (7 \times 5) \times (x \times x^3) \times (y^2 \times y^3) \\ = & 25x^5y^4 + 35x^4y^5 \end{aligned}$$

wb†Yq ,Ydj $25x^5y^4 + 35x^4y^5$

weKí c×wZ :

$$\begin{array}{r} 5x^2y + 7xy^2 \\ \times 5x^3y^3 \\ \hline 25x^5y^4 + 35x^4y^5 \end{array}$$

wb†Yq ,Ydj $25x^5y^4 + 35x^4y^5$

D`vniY 6 | $2a^3 - b^3 + 3abc$ tK a^4b^2 Øviv ,Y Ki |

$$\begin{aligned} \text{mgvavb : } & (2a^3 - b^3 + 3abc) \times a^4b^2 \\ & = (2a^3 \times a^4b^2) - (b^3 \times a^4b^2) + (3abc \times a^4b^2) \\ & = 2a^7b^2 - a^4b^5 + 3a^5b^3c \end{aligned}$$

$$\begin{array}{r} \text{weKí c} \times \text{wZ : } 2a^3 - b^3 + 3abc \\ \times a^4b^2 \\ \hline 2a^7b^2 - a^4b^5 + 3a^5b^3c \end{array}$$

$$\text{wb} \text{†Y} \text{†} \text{ ,Ydj } 2a^7b^2 - a^4b^5 + 3a^5b^3c.$$

D`vniY 7 | $-3x^2zy^3 + 4z^3xy^2 - 5y^4x^3z^2$ tK $-6x^2y^2z$ Øviv ,Y Ki |

$$\begin{aligned} \text{mgvavb : } & (-3x^2zy^3 + 4z^3xy^2 - 5y^4x^3z^2) \times (-6x^2y^2z) \\ & = (-3x^2zy^3) \times (-6x^2y^2z) + (4z^3xy^2) \times (-6x^2y^2z) - (5y^4x^3z^2) \times (-6x^2y^2z) \\ & = \{(-3) \times (-6) \times x^2 \times x^2 \times y^3 \times y^2 \times z \times z\} + \{4 \times (-6) \times x \times x^2 \times y^2 \times y^2 \times z^3 \times z\} \\ & \quad - \{5 \times (-6) \times x^3 \times x^2 \times y^4 \times y^2 \times z^2 \times z\} \\ & = 18x^4y^5z^2 + (-24x^3y^4z^4) - (-30x^5y^6z^3) \\ & = 18x^4y^5z^2 - 24x^3y^4z^4 + 30x^5y^6z^3 \end{aligned}$$

$$\text{wb} \text{†Y} \text{†} \text{ ,Ydj } 18x^4y^5z^2 - 24x^3y^4z^4 + 30x^5y^6z^3.$$

KvR : 1 | cŭg iwktK wZxq iwki Øviv ,Y Ki :

$$(K) 5a^2 + 8b^2, 4ab$$

$$(L) 3p^2q + 6pq^3 + 10p^3q^5, 8p^3q^2$$

$$(M) -2c^2d + 3d^3c - 5cd^2, -7c^3d^5.$$

4.5 eûc`x iwktK eûc`x iwki Øviv ,Y

eûc`x iwktK eûc`x iwki Øviv ,Y Ki tZ ntj ,tY`i cŭZ`K c`tK ,YtKi cŭZ`K c` Øviv Avj v`v Avj v`vfvte ,Y Kti m`k c` ,tj vtK wb†P wb†P mwmR†q wj LtZ nq | AZtci wPyhy³ iwki thv†Mi wbqtg thvM Ki tZ nq | wem`k c` _vK†j tm ,tj vtK c_wKfvte wj LtZ nq Ges ,Ydtj emv†Z nq |

$$\begin{array}{rcll} \text{mgvavb :} & 3x + 2y & \longleftarrow & Y'' \\ & x + y & \longleftarrow & YK \\ \hline & 3x^2 + 2xy & \longleftarrow & x \text{ Øiviv } Y \\ & 3xy + 2y^2 & \longleftarrow & y \text{ Øiviv } Y \end{array}$$
$$3x^2 + 5xy + 2y^2.$$

	$3x$	$2y$
x	$3x^2$	$2xy$
y	$3xy$	$2y^2$

$$(3x + 2y) \times (x + y)$$

$$= 3x^2 + 5xy + 2y^2.$$

$$\begin{array}{rcll} \text{mgvarb : } & a^2 - 2ab + b^2 & \longleftarrow & Y'' \\ & \frac{a-b}{a^3 - 2a^2b + ab^2} & \longleftarrow & YK \\ & -a^2b + 2ab^2 - b^3 & \longleftarrow & a \text{ Øiv } Y \\ & & \longleftarrow & -b \text{ Øiv } Y \end{array}$$
$$a^3 - 3a^2b + 3ab^2 - b^3.$$
$$D^{\text{vni}} Y_{10} | 2x^2 + 3x - 4 \uparrow K 3x^2 - 4x - 5 \emptyset \text{viv}_s Y_{Ki} |$$

$$\begin{array}{rcl}
 \text{mgvarvb :} & 2x^2 + 3x - 4 & \longleftarrow \text{Y} \\
 & \underline{3x^2 - 4x - 5} & \longleftarrow \text{YK} \\
 & 6x^4 + 9x^3 - 12x^2 & \longleftarrow 3x^2 \otimes \text{vib Y} \\
 & \quad - 8x^3 - 12x^2 + 16x & \longleftarrow -4x \otimes \text{vib Y} \\
 & \quad \quad - 10x^2 - 15x + 20 & \longleftarrow -5 \otimes \text{vib Y} \\
 \text{thvM K\ddot{u}i,} & \underline{6x^4 + x^3 - 34x^2 + x + 20} & \longleftarrow \text{Ydj}
 \end{array}$$

$$6x^4 + x^3 - 34x^2 + x + 20.$$

KvR : 1g iwk tK 2q iwk Øviv_uY Ki :

(K) $x + 7, x + 9$

(L) $a^2 - ab + b^2, 3a + 4b$

(M) $x^2 - x + 1, 1 + x + x^2$.

Abkxj bx 4.1

1g iwk tK 2q iwk Øviv_uY Ki (1 t_utK 24) :

1| $3ab, 4a^3$

2| $5xy, 6az$

3| $5a^2x^2, 3ax^5y$

4| $8a^2b, -2b^2$

5| $-2abx^2, 10b^3xyz$

6| $-3p^2q^3, -6p^5q^4$

7| $-12m^2a^2x^3, -2ma^2x^2$

8| $7a^3bx^5y^2, -3x^5y^3a^2b^2$

9| $2x + 3y, 5xy$

10| $5x^2 - 4xy, 9x^2y^2$

11| $2a^2 - 3b^2 + c^2, a^3b^2$

12| $x^3 - y^3 + 3xyz, x^4y$

13| $2a - 3b, 3a + 2b$

14| $a + b, a - b$

15| $x^2 + 1, x^2 - 1$

16| $a^2 + b^2, a + b$

17| $a^2 - ab + b^2, a + b$

18| $x^2 + 2xy + y^2, x + y$

19| $x^2 - 2xy + y^2, x - y$

20| $x^2 + 2x - 3, x + 3$

21| $a^2 + ab + b^2, b^2 - ab + a^2$

22| $a + b + c, a + b + c$

23| $x^2 + xy + y^2, x^2 - xy + y^2$

24| $y^2 - y + 1, 1 + y + y^2$

25| $A = x^2 + xy + y^2$ Ges $B = x - y$ ntj, cØvY Ki th, $AB = x^3 - y^3$.

26| $A = a^2 - ab + b^2$ Ges $B = a + b$ ntj, $AB = KZ$?

27| t_uLvl th, $(a + 1)(a - 1)(a^2 + 1) = a^4 - 1$.

28| t_uLvl th, $(x + y)(x - y)(x^2 + y^2) = x^4 - y^4$.

4.6 exRMWZxq iwiki fVM

WPyhy³ iwiki fVM

Avgi v Rwb, $a \times (-b) = (-a) \times b = -ab$

mZivs, $-ab \div a = a \times (-b) \div a = -b$

GKBfvte, $-ab \div b = -a$

$-ab \div (-a) = b$

$-ab \div (-b) = a$

$$-\frac{ab}{a} = \frac{a \times (-b)}{a} = -b$$

$$\frac{-ab}{b} = \frac{(-a) \times b}{b} = -a$$

$$\frac{-ab}{-b} = \frac{(-a) \times b}{-b} = a$$

$$\frac{-a}{-ab} = \frac{-a}{a \times (-b)} = a$$

$$\frac{-a}{-b} = \frac{-a}{-b} = a$$

j ¶ Kwí :

* GKB WPyhy³ `Bw iwiki fVMdj (+) WPyhy³ nte|

* weci xZ WPyhy³ `Bw iwiki fVMdj (-) WPyhy³ nte|

$+$	$\frac{1}{1}$	$=$	$+$	1
$+$	$\frac{1}{1}$	$=$	$+$	1
$-$	$\frac{1}{1}$	$=$	$+$	1
$-$	$\frac{1}{1}$	$=$	$+$	1
$-$	$\frac{1}{1}$	$=$	$-$	1
$+$	$\frac{1}{1}$	$=$	$-$	1
$+$	$\frac{1}{1}$	$=$	$-$	1
$-$	$\frac{1}{1}$	$=$	$-$	1

fvfMi mPK weva

$$a^5 \div a^2 = \frac{a^5}{a^2} = \frac{a \times a \times a \times a \times a}{a \times a} = a \times a \times a \text{ [je l ni t_#K mvavi Y Drcv`K eR0 Kti]} \\ = a^3 = a^{5-2}, a \neq 0$$

mvavi Yfvte, $a^m \div a^n = a^{m-n}$, thLvfb $m \mid n$ vfvweK msL`v Ges $m > n, a \neq 0$.

GB c0µqv#K fvfMi mPK weva ej v nq|

j ¶ Kwí : $a \neq 0$ ntj ,

$$a^m \div a^m = \frac{a^m}{a^m} = a^{m-m} = a^0$$

$$\text{Avevi, } a^m \div a^m = \frac{a^m}{a^m} = 1$$

$$\therefore a^0 = 1, (a \neq 0).$$

$$\text{AbymxvŠ: } a^0 = 1, a \neq 0.$$

4.7 GKc`x iwmktK GKc`x iwmk Øviv fvm

GKc`x iwmktK GKc`x iwmk Øviv fvm KiþZ ntj, mvsml`K mnMþK cvmUMmYZxq wbtg fvm Ges exRMmYZxq cØxKþK mPK wbtg fvm KiþZ nq|

D`vniY 11| $10a^5b^7$ tK $5a^2b^3$ Øviv fvm Ki |

$$\begin{aligned} \text{mgvavb} : \frac{10a^5b^7}{5a^2b^3} &= \frac{10}{5} \times \frac{a^5}{a^2} \times \frac{b^7}{b^3} \\ &= 2 \times a^{5-2} \times b^{7-3} = 2a^3b^4 \end{aligned}$$

wbtYq fvmDj $2a^3b^4$

D`vniY 12| $40x^8y^{10}z^5$ tK $-8x^4y^2z^4$ Øviv fvm Ki |

$$\begin{aligned} \text{mgvavb} : \frac{40x^8y^{10}z^5}{-8x^4y^2z^4} &= \frac{40}{-8} \times \frac{x^8}{x^4} \times \frac{y^{10}}{y^2} \times \frac{z^5}{z^4} \\ &= -5 \times x^{8-4} \times y^{10-2} \times z^{5-4} = -5x^4y^8z \end{aligned}$$

wbtYq fvmDj $-5x^4y^8z$.

D`vniY 13| $-45x^{13}y^9z^4$ tK $-5x^6y^3z^2$ Øviv fvm Ki |

$$\begin{aligned} \text{mgvavb} : \frac{-45x^{13}y^9z^4}{-5x^6y^3z^2} &= \frac{-45}{-5} \times \frac{x^{13}}{x^6} \times \frac{y^9}{y^3} \times \frac{z^4}{z^2} \\ &= 9 \times x^{13-6} \times y^{9-3} \times z^{4-2} = 9x^7y^6z^2 \end{aligned}$$

wbtYq fvmDj $9x^7y^6z^2$

KvR : cØg iwmktK wØZxq iwmk Øviv fvm Ki :

(K) $12a^3b^5c, 3ab^2$

(L) $-28p^3q^2r^5, 7p^2qr^3$

(M) $35x^5y^7, -5x^5y^2$

(N) $-40x^{10}y^5z^9, -8x^6y^2z^5$

4.8 euc`x iwmktK GKc`x iwmk Øviv fvm

Avgiv Rwb, $a+b+c$ GKwU euc`x iwmk|

GLb $(a+b+c) \div d$

$$= (a+b+c) \times \frac{1}{d}$$

$$= a \times \frac{1}{d} + b \times \frac{1}{d} + c \times \frac{1}{d} \quad [\text{,tYi eEb weia}]$$

$$= \frac{a}{d} + \frac{b}{d} + \frac{c}{d}$$

Avevi , $(a+b+c) \div d$

$$= \frac{a+b+c}{d} = \frac{a}{d} + \frac{b}{d} + \frac{c}{d}$$

D`vniY 14 | $10x^5y^3 - 12x^3y^8 + 6x^4y^7$ tK $2x^2y^2$ Øviv fVM Ki |

$$\begin{aligned} \text{mgvavb : } & \frac{10x^5y^3 - 12x^3y^8 + 6x^4y^7}{2x^2y^2} \\ &= \frac{10x^5y^3}{2x^2y^2} - \frac{12x^3y^8}{2x^2y^2} + \frac{6x^4y^7}{2x^2y^2} \\ &= 5x^{5-2}y^{3-2} - 6x^{3-2}y^{8-2} + 3x^{4-2}y^{7-2} \\ &= 5x^3y - 6xy^6 + 3x^2y^5 \end{aligned}$$

wb†Yq fVMdj $5x^3y - 6xy^6 + 3x^2y^5$.

D`vniY 15 | $35a^5b^4c + 20a^6b^8c^3 - 40a^5b^6c^4$ tK $5a^2b^3c$ Øviv fVM Ki |

$$\begin{aligned} \text{mgvavb : } & \frac{35a^5b^4c + 20a^6b^8c^3 - 40a^5b^6c^4}{5a^2b^3c} \\ &= \frac{35a^5b^4c}{5a^2b^3c} + \frac{20a^6b^8c^3}{5a^2b^3c} - \frac{40a^5b^6c^4}{5a^2b^3c} \\ &= 7a^{5-2}b^{4-3}c^{1-1} + 4a^{6-2}b^{8-3}c^{3-1} - 8a^{5-2}b^{6-3}c^{4-1} \\ &= 7a^3b + 4a^4b^5c^2 - 8a^3b^3c^3 \quad [\because c^{1-1} = c^0 = 1] \end{aligned}$$

wb†Yq fVMdj $7a^3b + 4a^4b^5c^2 - 8a^3b^3c^3$.

KvR : 1 | $9x^4y^5 + 12x^8y^5 + 21x^9y^6$ tK $3x^3y^2$ Øviv fVM Ki |

2 | $28a^5b^6 - 16a^6b^8 - 20a^7b^5$ tK $4x^4y^3$ Øviv fVM Ki |

4.9 euc`x iwk tK euc`x iwk Øviv fM

euc`x iwk tK euc`x iwk Øviv fM Kivi t $\frac{1}{2}$ c $\frac{1}{2}$ g fVR I fVRK Df $\frac{1}{2}$ qi gta Av $\frac{1}{2}$ Ggb GKwJ exRMwYzXq c $\frac{1}{2}$ x $\frac{1}{2}$ Ki Nv $\frac{1}{2}$ Zi Aat $\frac{1}{2}$ ug Abj $\frac{1}{2}$ vti iwk Øq $\frac{1}{2}$ tK mVR $\frac{1}{2}$ tZ nte | Gici c $\frac{1}{2}$ wUMwY $\frac{1}{2}$ Zi fM c $\frac{1}{2}$ u $\frac{1}{2}$ qvi g $\frac{1}{2}$ Zv w $\frac{1}{2}$ tPi w $\frac{1}{2}$ q $\frac{1}{2}$ g av $\frac{1}{2}$ c av $\frac{1}{2}$ c fM Ki $\frac{1}{2}$ Z nte |

- * fVR $\frac{1}{2}$ i c $\frac{1}{2}$ g c $\frac{1}{2}$ w $\frac{1}{2}$ tK fVR $\frac{1}{2}$ Ki c $\frac{1}{2}$ g c $\frac{1}{2}$ Øviv fM Ki $\frac{1}{2}$ tj th fM $\frac{1}{2}$ dj nq Zv w $\frac{1}{2}$ tY $\frac{1}{2}$ fM $\frac{1}{2}$ d $\frac{1}{2}$ tj i c $\frac{1}{2}$ g c $\frac{1}{2}$ |
- * fM $\frac{1}{2}$ d $\frac{1}{2}$ tj i H c $\frac{1}{2}$ g c $\frac{1}{2}$ Øviv fVR $\frac{1}{2}$ Ki c $\frac{1}{2}$ ØZ $\frac{1}{2}$ K c $\frac{1}{2}$ tK $\frac{1}{2}$ Y K $\frac{1}{2}$ i $\frac{1}{2}$ Ydj m $\frac{1}{2}$ k c $\frac{1}{2}$ Ab $\frac{1}{2}$ h $\frac{1}{2}$ v $\frac{1}{2}$ q $\frac{1}{2}$ x fVR $\frac{1}{2}$ i w $\frac{1}{2}$ tP ew $\frac{1}{2}$ t $\frac{1}{2}$ q fVR $\frac{1}{2}$ t $\frac{1}{2}$ tK w $\frac{1}{2}$ et $\frac{1}{2}$ q $\frac{1}{2}$ M Ki $\frac{1}{2}$ Z nte |
- * w $\frac{1}{2}$ et $\frac{1}{2}$ q $\frac{1}{2}$ M $\frac{1}{2}$ dj bZb fVR $\frac{1}{2}$ nte | w $\frac{1}{2}$ et $\frac{1}{2}$ q $\frac{1}{2}$ M $\frac{1}{2}$ dj Ggb fVR $\frac{1}{2}$ te w $\frac{1}{2}$ j L $\frac{1}{2}$ tZ nte thb Zv Av $\frac{1}{2}$ Mi g $\frac{1}{2}$ Zv w $\frac{1}{2}$ et $\frac{1}{2}$ P $\frac{1}{2}$ c $\frac{1}{2}$ Øx $\frac{1}{2}$ tKi Aat $\frac{1}{2}$ ug Abj $\frac{1}{2}$ vti $\frac{1}{2}$ v $\frac{1}{2}$ tK |
- * bZb fVR $\frac{1}{2}$ i c $\frac{1}{2}$ g c $\frac{1}{2}$ w $\frac{1}{2}$ tK fVR $\frac{1}{2}$ Ki c $\frac{1}{2}$ g c $\frac{1}{2}$ Øviv fM Ki $\frac{1}{2}$ tj th fM $\frac{1}{2}$ dj nq Zv w $\frac{1}{2}$ tY $\frac{1}{2}$ fM $\frac{1}{2}$ d $\frac{1}{2}$ tj i w $\frac{1}{2}$ ØZ $\frac{1}{2}$ xq c $\frac{1}{2}$ |
- * GfVR $\frac{1}{2}$ te μ g $\frac{1}{2}$ v $\frac{1}{2}$ š $\frac{1}{2}$ t $\frac{1}{2}$ q fM Ki $\frac{1}{2}$ Z nte |

D`vniY 16 | $6x^2 + x - 2$ tK $2x - 1$ Øviv fM Ki |

mgvavb : GLv $\frac{1}{2}$ t $\frac{1}{2}$ b fVR I fVRK Df $\frac{1}{2}$ qB x Gi Nv $\frac{1}{2}$ Zi Aat $\frac{1}{2}$ ug Abj $\frac{1}{2}$ vti mVR $\frac{1}{2}$ t $\frac{1}{2}$ bv Av $\frac{1}{2}$ Q |

$$\begin{array}{r}
 2x - 1 \quad 6x^2 + x - 2 \quad (3x + 2) \\
 \quad \quad 6x^2 - 3x \\
 \quad (-) \quad (+) \\
 \hline
 \quad \quad 4x - 2 \\
 \quad \quad 4x - 2 \\
 \quad (-) \quad (+) \\
 \hline
 \quad \quad 0
 \end{array}$$

$$1g \text{ avc : } 6x^2 \div 2x = 3x$$

$$2q \text{ avc : } 4x \div 2x = 2$$

w $\frac{1}{2}$ tY $\frac{1}{2}$ fM $\frac{1}{2}$ dj $3x + 2$.

D`vniY 17 | $2x^2 - 7xy + 6y^2$ tK $x - 2y$ Øviv fM Ki |

mgvavb : GLv $\frac{1}{2}$ t $\frac{1}{2}$ b iwk $\frac{1}{2}$ Øw $\frac{1}{2}$ x Gi Nv $\frac{1}{2}$ Zi Aat $\frac{1}{2}$ ug Abj $\frac{1}{2}$ vti mVR $\frac{1}{2}$ t $\frac{1}{2}$ bv Av $\frac{1}{2}$ Q |

$$\begin{array}{r}
 x - 2y \quad 2x^2 - 7xy + 6y^2 \quad (2x - 3y) \\
 \quad \quad 2x^2 - 4xy \\
 \quad (-) \quad (+) \\
 \hline
 \quad \quad -3xy + 6y^2 \\
 \quad \quad -3xy + 6y^2 \\
 \quad (+) \quad (-) \\
 \hline
 \quad \quad 0
 \end{array}$$

$$1g \text{ avc : } 2x^2 \div x = 2x$$

$$2q \text{ avc : } -3xy \div x = -3y$$

w $\frac{1}{2}$ tY $\frac{1}{2}$ fM $\frac{1}{2}$ dj $2x - 3y$.

D`vniY 18 | $16x^4 + 36x^2 + 81$ †K $4x^2 - 6x + 9$ Øviv fVM Ki |
mgvavb : GLvfb i vnk `BwJ x Gi Nv†Zi Aatµg Abjnv†i mvRv†bv Av†Q |

$$\begin{array}{r}
 4x^2 - 6x + 9 \big) 16x^4 + 36x^2 + 81 \big(4x^2 + 6x + 9 \\
 \underline{16x^4 + 36x^2 - 24x^3} \\
 (-) \quad (-) \quad (+) \\
 \hline
 24x^3 + 81 \\
 24x^3 - 36x^2 + 54x \\
 (-) \quad (+) \quad (-) \\
 \hline
 36x^2 - 54x + 81 \\
 36x^2 - 54x + 81 \\
 (-) \quad (+) \quad (-) \\
 \hline
 0
 \end{array}$$

$$1q \text{ avc} : 16x^4 \div 4x^2 = 4x^2$$

$$2q \text{ avc} : 24x^3 \div 4x^2 = 6x$$

$$3q \text{ avc} : 36x^2 \div 4x^2 = 9$$

wb†Yq fVMdj $4x^2 + 6x + 9$.

gŠe` : 2q av†c bZb fVR`†K | x Gi Nv†Zi Aatµg Abjnv†i mvwR†q tj Lv ntq†Q |

D`vniY 19 | $2x^4 + 110 - 48x$ †K $4x + 11 + x^2$ Øviv fVM Ki |

mgvavb : fVR` | fVRK Dfq†K x Gi Nv†Zi Aatµg Abjnv†i mvwR†q cvB,

$$fVR` = 2x^4 + 110 - 48x = 2x^4 - 48x + 110$$

$$fVRK = 4x + 11 + x^2 = x^2 + 4x + 11$$

GLb, $x^2 + 4x + 11$) $2x^4 - 48x + 110$ ($2x^2 - 8x + 10$

$$\begin{array}{r}
 2x^4 + 8x^3 + 22x^2 \\
 \hline
 - 8x^3 - 22x^2 - 48x + 110 \\
 - 8x^3 - 32x^2 - 88x \\
 \hline
 10x^2 + 40x + 110 \\
 10x^2 + 40x + 110 \\
 \hline
 0
 \end{array}$$

wb†Yq fVMdj $2x^2 - 8x + 10$.

D`vniY 20 | $x^4 - 1$ tK $x^2 + 1$ Øviv fM Ki |

mgvavb : GLvfb iWk `Bw x Gi NvZi Aatµg Abmvfi mVRvfbv AvfQ |

$$\begin{array}{r} x^2 + 1 \big) x^4 - 1 \big(x^2 - 1 \\ \underline{x^4 + x^2} \\ -x^2 - 1 \\ \underline{-x^2 - 1} \\ 0 \end{array}$$

wbYq fMdj $x^2 - 1$.

KvR : 1 | $2m^2 - 5mn + 2n^2$ tK $2m - n$ Øviv fM Ki |

2 | $a^4 + a^2b^2 + b^4$ tK $a^2 - ab + b^2$ Øviv fM Ki |

3 | $81p^4 + q^4 - 22p^2q^2$ tK $9p^2 + 2pq - q^2$ Øviv fM Ki |

AbKxj bx 4.2

cŭg iWktK wZxq iWk Øviv fM Ki :

- | | |
|---|---|
| 1 $45a^4, 9a^2$ | 2 $-24a^5, 3a^2$ |
| 3 $30a^4x^3, -6a^2x$ | 4 $-28x^4y^3z^2, 4xy^2z$ |
| 5 $-36a^3z^3y^2, -4ayz$ | 6 $-22x^3y^2z, -2xyz$ |
| 7 $3a^3b^2 - 2a^2b^3, a^2b^2$ | 8 $36x^4y^3 + 9x^5y^2, 9xy$ |
| 9 $a^3b^4 - 3a^7b^7, -a^3b^3$ | 10 $6a^5b^3 - 9a^3b^4, 3a^2b^2$ |
| 11 $15x^3y^3 + 12x^3y^2 - 12x^5y^3, 3x^2y^2$ | 12 $6x^8y^6z - 4x^4yz + 2x^2y^2z^2, 2x^2y^2z$ |
| 13 $24a^2b^2c - 15a^4b^4c^4 - 9a^2b^6c^2, -3ab^2$ | 14 $a^3b^2 + 2a^2b^3, a + 2b$ |
| 15 $6x^2 + x - 2, 2x - 1$ | 16 $6y^2 + 3x^2 - 11xy, 3x - 2y$ |
| 17 $x^3 + y^3, x + y$ | 18 $a^2 + 4axyz + 4x^2y^2z^2, a + 2xyz$ |
| 19 $16p^4 - 81q^4, 2p + 3q$ | 20 $64 - a^3, a - 4$ |
| 21 $x^2 - 8xy + 16y^2, x - 4y$ | 22 $x^4 + 8x^2 + 15, x^2 + 5$ |
| 23 $x^4 + x^2 + 1, x^2 - x + 1$ | 24 $4a^4 + b^4 - 5a^2b^2, 4a^2 - b^2$ |
| 25 $2a^2b^2 + 5abd + 3d^2, ab + d$ | 26 $x^4y^4 - 1, x^2y^2 + 1$ |
| 27 $1 - x^6, 1 - x + x^2$ | 28 $x^2 - 8abx + 15a^2b^2, x - 3ab$ |
| 29 $x^3y - 2x^2y^2 + axy, x^2 - 2xy + a$ | 30 $a^2bc + b^2ca + c^2ab, a + b + c$ |
| 31 $a^2x - 4ax + 3ax^2, a + 3x - 4$ | 32 $81x^4 + y^4 - 22x^2y^2, 9x^2 + 2xy - y^2$ |
| 33 $12a^4 + 11a^2 + 2, 3a^2 + 2$ | 34 $x^4 + x^2y^2 + y^4, x^2 - xy + y^2$ |
| 35 $a^5 + 11a - 12, a^2 - 2a + 3$ | |

KvR : wbtPi iwk _Y tj vi gvb AcwiewZ ² ti tL eÜbx ⁻ vcb Ki :			
iwk	eÜbxi AvtMi wPy	eÜbxi Ae ⁻ vb	eÜbxhy ³ iwk
$7 + 5 - 2$	+	$2q \mid 3q \text{ c}^{\sim} 1g$ eÜbxf ^{l3}	
$7 - 5 + 2$	-	0 0	
$a - b + c - d$	+	$3q \mid 4 \text{ c}^{\sim} 1g$ eÜbxf ^{l3}	
$a - b - c - d$	-	0 0	

KvR : wbtPi iwk _Y tj vi eÜbx AcmviY Ki :	
eÜbxhy ³ iwk	eÜbxgy ³ iwk
$8 + (6 - 2)$	
$8 - (6 - 2)$	
$p + q + (r - s)$	
$p + q - (r - s)$	

D`vniY 21 | mij Ki : $6 - 2\{5 - (8 - 3) + (5 + 2)\}$.

mgvavb : $6 - 2\{5 - (8 - 3) + (5 + 2)\}$.

$$= 6 - 2\{5 - 5 + 7\}$$

$$= 6 - 2\{+7\}$$

$$= 6 - 14$$

$$= -8.$$

D`vniY 22 | mij Ki : $a + \{b - (c - d)\}$.

mgvavb : $a + \{b - (c - d)\}$

$$= a + \{b - c + d\}$$

$$= a + b - c + d.$$

D`vniY 23 | mij Ki : $a - [b - \{c - (d - e)\} - f]$

mgvavb : $a - [b - \{c - (d - e)\} - f]$

$$= a - [b - \{c - d + e\} - f]$$

$$= a - [b - c + d - e - f]$$

$$= a - b + c - d + e + f.$$

D`vniY 24 | mij Ki : $3x - [5y - \{10z - (5x - 10y + 3z)\}]$.

$$\begin{aligned} \text{mgvavb : } & 3x - [5y - \{10z - (5x - 10y + 3z)\}] \\ &= 3x - [5y - \{10z - 5x + 10y - 3z\}] \\ &= 3x - [5y - \{7z - 5x + 10y\}] \\ &= 3x - [5y - 7z + 5x - 10y] \\ &= 3x - [5x - 5y - 7z] \\ &= 3x - 5x + 5y + 7z \\ &= -2x + 5y + 7z \\ &= 5y - 2x + 7z. \end{aligned}$$

D`vniY 25 | $3x - 4y - 8z + 5$ Gi ZZxq I PZL[©] eÜbxi AvtM (-) wPy w`tq cÜg eÜbxf^ß Ki | cieZ^ß Z^ß wZxq c` I cÜg eÜbxf^ß iwk[†] K wZxq eÜbxf^ß Ki thb eÜbxi AvtM (-) wPy _v[†] K |

mgvavb : $3x - 4y - 8z + 5$ iwk[†] Uⁱ ZZxq I PZL[©] h_v[†] t^g 8z I 5.

c[†] k[†] v[†] i[†] , $3x - 4y - (8z - 5)$

Avevi , $3x - \{4y + (8z - 5)\}$.

KvR : mij Ki :

$$1 | x - \{2x - (3y - 4x + 2y)\}$$

$$2 | 8x + y - [7x - \{5x - (4x - 3x - y) + 2y\}]$$

Abkxj bx 4.3

1 | $3a^2b$ Ges $-4ab^2$ Gi _Ydj w[†] t[†] Pi t[†] Kvbw ?

$$(K) -12a^2b^2 \quad (L) -12a^3b^2 \quad (M) -12a^2b^3 \quad (N) -12a^3b^3$$

2 | $20a^6b^3$ t[†] K $4a^3b$ Øviv f[†] vM Ki t[†] j f[†] vMdj w[†] t[†] Pi t[†] Kvbw ?

$$(K) 5a^3b \quad (L) 5a^6b^2 \quad (M) 5a^3b^2 \quad (N) 5a^3b^3$$

3 | $\frac{-25x^3y}{5xy^3} = KZ ?$

$$(K) -5x^2y^2 \quad (L) 5x^2y^2 \quad (M) \frac{5x^2}{y^2} \quad (N) \frac{-5x^2}{y^2}$$

4 | $a = 3, b = 2$ ntj , $(8a - 2b) + (-7a + 4b)$ Gi gvb KZ ?

$$(K) 3 \quad (L) 4 \quad (M) 7 \quad (N) 15$$

5| $x = -1$ ntj , $x^3 + 2x^2 - 1$ Gi gvb wbtPi tKvbW ?

(K) 0 (L) -1 (M) 1 (N) -2

6| $10x^6y^5z^4$ tK $-5x^2y^2z^2$ Øviv fM Ki t j fMdj KZ nte ?

(K) $-2x^4y^2z^3$ (L) $-2x^4y^3z^2$ (M) $-2x^3y^3z^3$ (N) $-2x^4y^3z^3$

7| $4a^4 - 6a^3 + 3a + 14$ GKW exRMWZxq i wki | GKRB wk¶v_® i wkiW t_tK wbtPi Z_„tj v wj Ltj v |

(i) euc`x i wkiW i Pj K a

(ii) euc`wW i gvT v 4

(iii) a^3 Gi mnM 6

Dcti i Zt_`i wfwEtZ wbtPi tKvbW mWVK ?

(K) i | ii (L) ii | iii (M) i | iii (N) i, ii | iii

8| 2 eQi cte®evetj i eqm x eQi Ges Zvi gvØi eqm $5x$ eQi wQj | Zvntj

(1) gvØi eZgYb eqm KZ ?

(K) x eQi (L) $5x$ eQi (M) $(x + 2)$ eQi (N) $(5x + 2)$ eQi

(2) `BRtbi eZgYb eqtmi mgw KZ ?

(K) $6x$ eQi (L) $(5x + 4)$ eQi (M) $(6x + 4)$ eQi (N) $(6x + 2)$ eQi

(3) `BRtbi eZgYb eqtmi cv_® KZ ?

(K) $(6x - 4)$ eQi (L) $(4x - 2)$ eQi (M) $(x - 2)$ eQi (N) $4x$ eQi

mij Ki (9 t_tK 23) :

9| $7 + 2[-8 - \{-3 - (-2 - 3)\} - 4]$

10| $-5 - [-8 - \{-4 - (-2 - 3)\} + 13]$

11| $7 - 2[-6 + 3\{-5 + 2(4 - 3)\}]$

12| $x - \{a + (y - b)\}$

13| $3x + (4y - z) - \{a - b - (2c - 4a) - 5a\}$

14| $-a + [-5b - \{-9c + (-3a - 7b + 11c)\}]$

- 15 | $-a - [-3b - \{-2a - (-a - 4b)\}]$
- 16 | $\{2a - (3b - 5c)\} - [a - \{2b - (c - 4a)\} - 7c]$
- 17 | $-a + [-6b - \{-15c + (-3a - 9b - 13c)\}]$
- 18 | $-2x - [-4y - \{-6z - (8x - 10y + 12z)\}]$
- 19 | $3x - 5y + [2 + (3y - x) + \{2x - (x - 2y)\}]$
- 20 | $4x + [-5y - \{9z + (3x - 7y + x)\}]$
- 21 | $20 - [\{(6a + 3b) - (5a - 2b)\} + 6]$
- 22 | $15a + 2[3b + 3\{2a - 2(2a + b)\}]$
- 23 | $[8b - 3\{2a - 3(2b + 5) - 5(b - 3)\}] - 3b$
- 24 | eÜbxi cte(-) wPy w` tq $a - b + c - d$ Gi 2q, 3q I 4_c` cÜg eÜbxi wFZi vcb Ki |
- 25 | $a - b - c + d - m + n - x + y$ iwk tZ eÜbxi AvtM (-) wPy w` tq 2q, 3q I 4_c` I (+)
wPy w` tq 6ô I 7g c` cÜg eÜbxf³ Ki |
- 26 | $7x - 5y + 8z - 9$ Gi ZZxq I PZ_c` eÜbxi AvtM (-) wPy w` tq cÜg eÜbxf³ Ki | cti
wZxq c` I cÜg eÜbxf³ iwk tK wZxq eÜbxf³ Ki thb eÜbxi AvtM (+) wPy v tK |
- 27 | $15x^2 + 7x - 2$ Ges $5x - 1$ `Bw exRMwYZxq iwk |
(K) cÜg iwk t tK wZxq iwk wetqvM Ki |
(L) iwk tqi Ydj wbYq Ki |
(M) cÜg iwk tK wZxq iwk Øvi v fvM Ki |
- 28 | $2x + y, 3x - z$ Ges $x - 4y - 3z + 2$ wZbw exRMwYZxq iwk |
(K) cÜg I wZxq iwiki thvMdj tei Ki |
(L) ZZxq iwiki thvMvZK weci xZ iwk tj L Ges cÜg I wZxq iwiki thvMdj t tK cÜB ZZxq
iwiki wetqvM Ki |
(M) mij Ki : $7 + [(2x + y) - \{(3x - z) - (x - 4y - 3z + 2) + 10\}]$
(N) ZZxq iwk tK cÜg iwk Øviv Y Ki |

cÂg Aa'vq exRMwYZxq mĥvej I cĦqvM

exRMwYZxq cĦxK Øviv cKvkZ thĥKvĥbv mvaviY wbgg ev wmxvšĥK exRMwYZxq mĥ ev mstĦĥc mĥ ej v nq| Avgiv wewfbetĦĥĥ mĥ e'envi Kĥi _wK| G Aa'vtq cĦg Pviw mĥ Ges G Pviw mĥĥi mrvvĥh" Abymxvš-wYĦqi c×wZ ĥ`Lvĥbv ntqĥQ| G Qvov exRMwYZxq mĥ I Abymxvš-cĦqvM Kĥi exRMwYZxq iwki gvb wYĦ I Drcv`ĥK wĥkH Dc`vcb Kiv ntqĥQ| Avevi exRMwYZxq iwki mrvvĥh" fvr", fvrK, YbxqK, wYZK mæutK©aviYv ĥ`Iqv ntqĥQ Ges Kxfvte AbaĦ©wZbw exRMwYZxq iwki M.mv. . I j .mv. . wYĦ Kiv hvq Zv Avĥj vPbv Kiv ntqĥQ|

Aa'vq ĥĥĥI wKĦv_Ħv –

- eMwYĦq exRMwYZxq mĥĥi eYØv I cĦqvM KiĥZ cviĥe|
- exRMwYZxq mĥ I Abymxvš-cĦqvM Kĥi iwki gvb wYĦ KiĥZ cviĥe|
- exRMwYZxq mĥ cĥqvM Kĥi Drcv`ĥK wĥkH KiĥZ cviĥe|
- YbxqK I wYZK Kx Zv e'vL'v KiĥZ cviĥe|
- AbaĦ©wZbw exRMwYZxq iwki mvsuL`K mnMmn M.mv. . I j .mv. . wYĦ KiĥZ cviĥe|

5.1 exRMwYZxq mĥvej

$$mĥ 1| \quad (a + b)^2 = a^2 + 2ab + b^2$$

$$cĥvY : \quad (a + b)^2 \text{ Gi } A_{-}^{\circ}(a + b) \text{ ĥK } (a + b) \text{ Øviv } _Y|$$

$$\begin{aligned} \therefore (a + b)^2 &= (a + b)(a + b) \\ &= a(a + b) + b(a + b) \\ &= a^2 + ab + ba + b^2 \\ &= a^2 + ab + ab + b^2 \end{aligned}$$

$$\therefore (a + b)^2 = a^2 + 2ab + b^2$$

$$\text{Bw iwki thvMdĥj i eM}^{\circ} = 1g \text{ iwki eM}^{\circ} + 2 \times 1g \text{ iwki} \times 2q \text{ iwki} + 2q \text{ iwki eM}^{\circ}$$

mathematical induction :

$ABCD$ is a rectangle

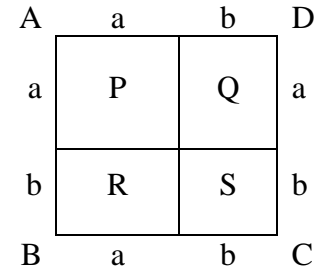
$$AB = a$$

$$BC = b$$

Let a and b be any positive integers

Let P, Q, R, S be the midpoints of the sides

P, Q, R, S are the midpoints of the sides



Let P and S be the midpoints of the sides AB and DA respectively

Let R and Q be the midpoints of the sides CD and BC respectively

$$PQ = \frac{1}{2} \times \text{diagonal} = \frac{1}{2} \times \sqrt{a^2 + b^2}$$

$$QR = \frac{1}{2} \times \text{diagonal} = \frac{1}{2} \times \sqrt{a^2 + b^2}$$

$$RS = \frac{1}{2} \times \text{diagonal} = \frac{1}{2} \times \sqrt{a^2 + b^2}$$

$$SP = \frac{1}{2} \times \text{diagonal} = \frac{1}{2} \times \sqrt{a^2 + b^2}$$

$$PQRS = \frac{1}{2} \times \text{diagonal} = \frac{1}{2} \times \sqrt{a^2 + b^2}$$

$$\therefore (a+b)^2 = a^2 + ab + ab + b^2$$

$$= a^2 + 2ab + b^2$$

$$\therefore (a+b)^2 = a^2 + 2ab + b^2$$

$$\text{Let } a^2 + b^2 = (a+b)^2 - 2ab$$

$$\text{Let } (a+b)^2 = a^2 + 2ab + b^2$$

$$\text{Let } (a+b)^2 - 2ab = a^2 + 2ab + b^2 - 2ab$$

[Let $2ab$ be the common term]

$$\text{Let } (a+b)^2 - 2ab = a^2 + b^2$$

$$\therefore a^2 + b^2 = (a+b)^2 - 2ab.$$

Let $(m+n)$ be any positive integer

$$\text{Let } (m+n)^2$$

$$= (m)^2 + 2 \times m \times n + (n)^2$$

$$= m^2 + 2mn + n^2$$

Let $(3x+4)$ be any positive integer

$$\text{Let } (3x+4)^2$$

$$= (3x)^2 + 2 \times 3x \times 4 + (4)^2$$

$$= 9x^2 + 24x + 16$$

D`vniY 3 | $(2x+3y)$ Gi eM^QWY^Q Ki |

$$\begin{aligned} \text{mgvavb : } (2x+3y)^2 \\ = (2x)^2 + 2 \times 2x \times 3y + (3y)^2 \\ = 4x^2 + 12xy + 9y^2 \end{aligned}$$

D`vniY 4 | eĤMP mĤ cĦqvM KĤi 105 Gi eM^QWY^Q Ki |

$$\begin{aligned} \text{mgvavb : } (105)^2 &= (100+5)^2 \\ &= (100)^2 + 2 \times 100 \times 5 + (5)^2 \\ &= 10000 + 1000 + 25 \\ &= 11025 \end{aligned}$$

KvR : mĤĤi mrvvĤh` iWk_u tĤvi eM^QWY^Q Ki :

1 $x+2y$	2 $3a+5b$	3 $5+2a$	4 15	5 103
------------	-------------	------------	--------	---------

$$\text{mĤ 2 | } (a-b)^2 = a^2 - 2ab + b^2$$

$$\text{cĤvY : } (a-b)^2 \text{ Gi A}_{-}^{\circ}(a-b) \text{ tK } (a-b) \text{ Øviv } _Y |$$

$$\begin{aligned} \therefore (a-b)^2 &= (a-b)(a-b) \\ &= a(a-b) - b(a-b) \\ &= a^2 - ab - ba + b^2 \\ &= a^2 - ab - ab + b^2 \end{aligned}$$

$$\therefore (a-b)^2 = a^2 - 2ab + b^2$$

`BvU iWki wēqWdĤĤi eM ^Q = 1g iWki eM ^Q - 2 × 1g iWk × 2q iWk + 2q iWki eM ^Q
--

j ¶ | Kwī : wØZxq mĤWU cĦg mĤĤi mrvvĤh`I WbY^Q Kiv hvq |

$$\text{Avgiv Rwb, } (a+b)^2 = a^2 + 2ab + b^2$$

$$\begin{aligned} \therefore \{(a+(-b))\}^2 &= a^2 + 2 \times a \times (-b) + (-b)^2 \quad [b \text{ Gi cwi eĤZ}^{\circ} - b \text{ ewmĤq}] \\ &= a^2 - 2ab + b^2 \end{aligned}$$

$$\text{Abym} \times \text{vŠ-2 | } a^2 + b^2 = (a-b)^2 + 2ab$$

$$\text{Avgiv Rwb, } (a-b)^2 = a^2 - 2ab + b^2$$

$$\text{ev, } (a-b)^2 + 2ab = a^2 - 2ab + b^2 + 2ab$$

$$[\text{DfqcĤ¶} \text{ } 2ab \text{ thvM KĤi}]$$

$$\text{ev, } (a-b)^2 + 2ab = a^2 + b^2$$

$$\therefore a^2 + b^2 = (a-b)^2 + 2ab$$

D`vniY 5 | $p - q$ Gi eM^qbY^q Ki |

$$\begin{aligned} \text{mgvavb : } (p - q)^2 \\ &= (p)^2 - 2 \times p \times q + (q)^2 \\ &= p^2 - 2pq + q^2 \end{aligned}$$

D`vniY 6 | $(5x - 3y)$ Gi eM^qbY^q Ki |

$$\begin{aligned} \text{mgvavb : } (5x - 3y)^2 \\ &= (5x)^2 - 2 \times 5x \times 3y + (3y)^2 \\ &= 25x^2 - 30xy + 9y^2 \end{aligned}$$

D`vniY 7 | e[†]M[†] m[†] c[†]q[†]M K[†]i 98 Gi eM^qbY^q Ki |

$$\begin{aligned} \text{mgvavb : } (98)^2 &= (100 - 2)^2 \\ &= (100)^2 - 2 \times 100 \times 2 + (2)^2 \\ &= 10000 - 400 + 4 \\ &= 9604 \end{aligned}$$

KvR : m[†]i i m[†]v[†]h[†] i[†]k[†] t[†]j[†] vi eM^qbY^q Ki :

1 | $5x - 3$ 2 | $ax - by$ 3 | 95 4 | $5x - 6$

c[†]g I w[†]Z[†]x[†]q m[†]i i Avi I K[†]qK[†]W Abj[†]m[†]v[†]S[†]:-

$$\begin{aligned} \text{Abj[†]m[†]v[†]S[†]-3 | } (a + b)^2 &= a^2 + 2ab + b^2 \\ &= a^2 + b^2 - 2ab + 4ab \quad [\because +2ab = -2ab + 4ab] \\ &= (a - b)^2 + 4ab \end{aligned}$$

$$\therefore (a + b)^2 = (a - b)^2 + 4ab$$

$$\begin{aligned} \text{Abj[†]m[†]v[†]S[†]-4 | } (a - b)^2 &= a^2 - 2ab + b^2 \\ &= a^2 + b^2 + 2ab - 4ab \quad [\because -2ab = +2ab - 4ab] \\ &= (a + b)^2 - 4ab \end{aligned}$$

$$\therefore (a - b)^2 = (a + b)^2 - 4ab$$

$$\text{Abj[†]m[†]v[†]S[†]-5 | } (a + b)^2 + (a - b)^2 = (a^2 + 2ab + b^2) + (a^2 - 2ab + b^2)$$

$$= a^2 + 2ab + b^2 + a^2 - 2ab + b^2$$

$$= 2a^2 + 2b^2$$

$$= 2(a^2 + b^2)$$

$$\therefore (a+b)^2 + (a-b)^2 = 2(a^2 + b^2)$$

$$\text{Abym}\times\text{VŠ-6} \mid (a+b)^2 - (a-b)^2 = (a^2 + 2ab + b^2) - (a^2 - 2ab + b^2)$$

$$= a^2 + 2ab + b^2 - a^2 + 2ab - b^2$$

$$= 4ab$$

$$\therefore (a+b)^2 - (a-b)^2 = 4ab$$

$$\text{D`vniY 8} \mid a+b=7 \text{ Ges } ab=9 \text{ ntj,}$$

$$a^2 + b^2 \text{ Gi gvb } \text{wbY}\text{Ki} \mid$$

$$\text{mgvavb : } a^2 + b^2 = (a+b)^2 - 2ab$$

$$= (7)^2 - 2 \times 9$$

$$= 49 - 18$$

$$= 31$$

$$\text{D`vniY 9} \mid a+b=5 \text{ Ges } ab=6 \text{ ntj,}$$

$$(a-b)^2 \text{ Gi gvb } \text{wbY}\text{Ki} \mid$$

$$\text{mgvavb : } (a-b)^2 = (a+b)^2 - 4ab$$

$$= (5)^2 - 4 \times 6$$

$$= 25 - 24$$

$$= 1$$

$$\text{D`vniY 10} \mid p - \frac{1}{p} = 8 \text{ ntj, cgvY Ki th, } p^2 + \frac{1}{p^2} = 66.$$

$$\text{mgvavb : } p^2 + \frac{1}{p^2} = \left(p - \frac{1}{p}\right)^2 + 2 \times p \times \frac{1}{p} \quad \left[\because a^2 + b^2 = (a-b)^2 + 2ab\right]$$

$$= (8)^2 + 2$$

$$= 64 + 2$$

$$= 66 \text{ (cgvYZ)}$$

weKí c×wZ :

$$\text{f`l qv AvtQ, } p - \frac{1}{p} = 8$$

$$\begin{aligned}
\therefore (x + y - z)^2 &= \{x + y - z\}^2 \\
&= (m - z)^2 \\
&= m^2 - 2mz + z^2 \\
&= (x + y)^2 - 2 \times (x + y) \times z + z^2 & [\text{m-Gi gvb ewmĤq}] \\
&= x^2 + 2xy + y^2 - 2xz - 2yz + z^2 \\
&= x^2 + y^2 + z^2 + 2xy - 2xz - 2yz
\end{aligned}$$

D`vniY 13 | $3x - 2y + 5z$ Gi eMqbyĤ Ki |

$$\begin{aligned}
\text{mgvavb : } (3x - 2y + 5z)^2 &= \{(3x - 2y) + 5z\}^2 \\
&= (3x - 2y)^2 + 2 \times (3x - 2y) \times 5z + (5z)^2 & [\because 1g \text{ iwk } 3x - 2y, 2q \text{ iwk} = 5z] \\
&= (3x)^2 - 2 \times 3x \times 2y + (2y)^2 + 2 \times 5z(3x - 2y) + 25z^2 \\
&= 9x^2 - 12xy + 4y^2 + 30xz - 20yz + 25z^2 \\
&= 9x^2 + 4y^2 + 25z^2 - 12xy + 30xz - 20yz.
\end{aligned}$$

D`vniY 14 | mij Ki : $(2x + 3y)^2 - 2(2x + 3y)(2x - 5y) + (2x - 5y)^2$

mgvavb : awi , $2x + 3y = a$ Ges $2x - 5y = b$

$$\begin{aligned}
c\check{O} \ddot{E} \text{ iwk} &= a^2 - 2ab + b^2 \\
&= (a - b)^2 \\
&= \{(2x + 3y) - (2x - 5y)\}^2 & [a \text{ I } b \text{ Gi gvb ewmĤq}] \\
&= \{2x + 3y - 2x + 5y\}^2 \\
&= (8y)^2 \\
&= 64y^2
\end{aligned}$$

D`vniY 15 | $x = 7$ Ges $y = 6$ nĤj , $16x^2 - 40xy + 25y^2$ Gi gvb wbyĤ Ki |

mgvavb : cĦ Ė iwk = $16x^2 - 40xy + 25y^2$

$$\begin{aligned}
 &= (4x)^2 - 2 \times 4x \times 5y + (5y)^2 \\
 &= (4x - 5y)^2 \\
 &= (4 \times 7 - 5 \times 6)^2 \quad [x \mid y \text{ Gi gvb ewm} \dagger q] \\
 &= (28 - 30)^2 \\
 &= (-2)^2 = (-2) \times (-2) \\
 &= 4
 \end{aligned}$$

KiR :

1 | $3x - 2y - z$ Gi eMqbyq Ki |

2 | mij Ki : $(5a - 7b)^2 + 2(5a - 7b)(9b - 4a) + (9b - 4a)^2$

3 | $x = 3$ ntj , $9x^2 - 24x + 16$ Gi gvb KZ ?

Abkxj bx 5.1

m†i i mrv†h eMqbyq Ki (1–16) :

- | | | | |
|-------------------|--------------------|---------------------|------------------------|
| 1 $a + 5$ | 2 $5x - 7$ | 3 $3a - 11xy$ | 4 $5a^2 + 9m^2$ |
| 5 55 | 6 990 | 7 $xy - 6y$ | 8 $ax - by$ |
| 9 97 | 10 $2x + y - z$ | 11 $2a - b + 3c$ | 12 $x^2 + y^2 - z^2$ |
| 13 $a - 2b - c$ | 14 $3x - 2y + z$ | 15 $bc + ca + ab$ | 16 $2a^2 + 2b - c^2$ |

mij Ki (17–24) :

- 17 | $(2a + 1)^2 - 4a(2a + 1) + 4a^2$
- 18 | $(5a + 3b)^2 + 2(5a + 3b)(4a - 3b) + (4a - 3b)^2$
- 19 | $(7a + b)^2 - 2(7a + b)(7a - b) + (7a - b)^2$
- 20 | $(2x + 3y)^2 + 2(2x + 3y)(2x - 3y) + (2x - 3y)^2$
- 21 | $(5x - 2)^2 + (5x + 7)^2 - 2(5x - 2)(5x + 7)$
- 22 | $(3ab - cd)^2 + 9(cd - ab)^2 + 6(3ab - cd)(cd - ab)$
- 23 | $(2x + 5y + 3z)^2 + (5y + 3z - x)^2 - 2(5y + 3z - x)(2x + 5y + 3z)$
- 24 | $(2a - 3b + 4c)^2 + (2a + 3b - 4c)^2 + 2(2a - 3b + 4c)(2a + 3b - 4c)$

gvb byq Ki (25–28) :

- 25 | $25x^2 + 36y^2 - 60xy$, hLb $x = -4$, $y = -5$
- 26 | $16a^2 - 24ab + 9b^2$, hLb $a = 7$, $b = 6$.

$$27 | 9x^2 + 30x + 25, \text{ hLb } x = -2.$$

$$28 | 81a^2 + 18ac + c^2, \text{ hLb } a = 7, c = -67.$$

$$29 | a - b = 7 \text{ Ges } ab = 3 \text{ ntj, t`Lvl th, } (a + b)^2 = 61.$$

$$30 | a + b = 5 \text{ Ges } ab = 12 \text{ ntj, t`Lvl th, } a^2 + b^2 = 1$$

$$31 | x + \frac{1}{x} = 5 \text{ ntj, cĤvY Ki th, } \left(x^2 - \frac{1}{x^2}\right)^2 = 525$$

$$32 | a + b = 8 \text{ Ges } a - b = 4 \text{ ntj, } ab = \text{KZ ?}$$

$$33 | x + y = 7 \text{ Ges } xy = 10 \text{ ntj, } x^2 + y^2 + 5xy \text{ Gi gvb KZ ?}$$

$$34 | m + \frac{1}{m} = 2 \text{ ntj, t`Lvl th, } m^4 + \frac{1}{m^4} = 2$$

$$\text{mĤ 3 | } (a + b)(a - b) = a^2 - b^2$$

$$\text{cĤvY : } (a + b)(a - b) = a(a - b) + b(a - b)$$

$$= a^2 - ab + ab - b^2$$

$$\therefore (a + b)(a - b) = a^2 - b^2$$

$$\text{`Bw iwk i thvMdj } \times \text{ Gt` i wēqvMdj } = \text{ iwk `Bw i eĤMĤ wēqvMdj}$$

$$\text{mĤ 4 | } (x + a)(x + b) = x^2 + (a + b)x + ab$$

$$\text{cĤvY : } (x + a)(x + b) = (x + a)x + (x + a)b$$

$$= x^2 + ax + bx + ab$$

$$= x^2 + (a + b)x + ab$$

$$\text{A_Ĥ, } (x + a)(x + b) = x^2 + (a \text{ Ges } b \text{ Gi exRMwYZxq thvMdj}) x + (a \text{ Ges } b \text{ Gi ,Ydj})$$

$$\text{D`vniY 16 | mĤĤ i mrvth` } 3x + 2y \text{ tK } 3x - 2y \text{ Øviv ,Y Ki |}$$

$$\text{mgvavb : } (3x + 2y)(3x - 2y)$$

$$= (3x)^2 - (2y)^2$$

$$= 9x^2 - 4y^2$$

$$\text{D`vniY 17 | mĤĤ i mrvth` } ax^2 + b \text{ tK } ax^2 - b \text{ Øviv ,Y Ki |}$$

$$\text{mgvavb : } (ax^2 + b)(ax^2 - b)$$

$$= (ax^2)^2 - (b)^2$$

$$= a^2x^4 - b^2$$

$$\text{D`vniY 18 | mĤĤ i mrvth` } 3x + 2y + 1 \text{ tK } 3x - 2y + 1 \text{ Øviv ,Y Ki |}$$

$$\text{mgvavb : } (3x + 2y + 1)(3x - 2y + 1)$$

$$\begin{aligned}
 &= \{(3x+1) + 2y\} \{(3x+1) - 2y\} \\
 &= (3x+1)^2 - (2y)^2 \\
 &= 9x^2 + 6x + 1 - 4y^2 \\
 &= 9x^2 - 4y^2 + 6x + 1
 \end{aligned}$$

D`vniY 19 | $a+3$ tK $a+2$ Øviv_Y Ki |

$$\begin{aligned}
 \text{mgvavb : } &(a+3)(a+2) \\
 &= a^2 + (3+2)a + 3 \times 2 \\
 &= a^2 + 5a + 6
 \end{aligned}$$

D`vniY 20 | $px+3$ tK $px-5$ Øviv_Y Ki |

$$\begin{aligned}
 \text{mgvavb : } &(px+3)(px-5) \\
 &= (px)^2 + \{3 + (-5)\} px + 3 \times (-5) \\
 &= p^2 x^2 + (3-5) px - 15 \\
 &= p^2 x^2 + (-2) px - 15 \\
 &= p^2 x^2 - 2 px - 15
 \end{aligned}$$

D`vniY 21 | $p^2 - 2r$ tK $p^2 - 3r$ Øviv_Y Ki |

$$\begin{aligned}
 \text{mgvavb : } &(p^2 - 2r)(p^2 - 3r) \\
 &= (p^2)^2 + (-2r - 3r)p^2 + (-2r) \times (-3r) \\
 &= p^4 - 5rp^2 + 6r^2 \\
 &= p^4 - 5p^2 r + 6r^2
 \end{aligned}$$

KiR : 1 | $(2a+3)$ tK $(2a-3)$ Øviv_Y Ki |

2 | $(4x+5)$ tK $(4x+3)$ Øviv_Y Ki |

3 | $(6a-7)$ tK $(6a+5)$ Øviv_Y Ki |

Abkxj bx 5.2

m#i i mrvth_Y Ydj wY@ Ki :

1 | $(4x+3), (4x-3)$

3 | $(ab+3), (ab-3)$

5 | $(4x^2+3y^2), (4x^2-3y^2)$

7 | $(x^2-x+1), (x^2+x+1)$

9 | $\left(\frac{1}{4}x - \frac{1}{3}y\right), \left(\frac{1}{4}x + \frac{1}{3}y\right)$

2 | $(13-12p), (13+12p)$

4 | $(10-xy), (10+xy)$

6 | $(a-b-c), (a+b+c)$

8 | $\left(x - \frac{1}{2}a\right), \left(x - \frac{5}{2}a\right)$

10 | $(a^4 + 3a^2x^2 + 9x^4), (9x^4 - 3a^2x^2 + a^4)$

$$11 | (x+1), (x-1), (x^2+1)$$

$$12 | (9a^2+b^2), (3a+b), (3a-b)$$

5.2 exRMWZxq iwkĭ Drcv`K

Avgi v Rmb, $6 = 2 \times 3$.

GLvĥb, 2 I 3 nĥj v 6 Gi `BĭU Drcv`K ev ,YbxqK |

3 bs mĥ tĥK Avgi v Rmb, $a^2 - b^2 = (a+b)(a-b)$

Zvntĥj, $(a+b) | (a-b)$ exRMWZxq iwkĭ $a^2 - b^2$ Gi `BĭU Drcv`K ev ,YbxqK |

tKvĥbv exRMWZxq iwkĭ `B ev ZĥZmaK iwkĭ ,Ydj nĥj, tKĥlv³ iwkĭ ,tĥvi cĥZ`KĭUĥK cĥg iwkĭ Drcv`K ev ,YbxqK ej v nq |

exRMWZxq weĥfbemĥ Ges ,tĥi weĥbgqweĥa, mĥthvMweĥa I eĤbweĥa eĥenvi Kĥi exRMWZxq iwkĥK Drcv`K weĥkĥY Kiv nq |

D`vniY 22 | $20x + 4y$ tK Drcv`K weĥkĥY Ki |

$$\begin{aligned} \text{mgvavb : } 20x + 4y &= 4 \times 5x + 4 \times y \\ &= 4(5x + y) \text{ [,tĥi eĤbweĥa Abĥhvqx]} \end{aligned}$$

D`vniY 23 | $ax - by + ax - by$ tK Drcv`K weĥkĥY Ki |

$$\begin{aligned} \text{mgvavb : } ax - by + ax - by &= ax + ax - by - by \\ &= 2ax - 2by = 2(ax - by) \end{aligned}$$

D`vniY 24 | Drcv`K weĥkĥY Ki : $2x - 6x^2$

$$\text{mgvavb : } 2x - 6x^2 = 2x(1 - 3x)$$

D`vniY 25 | Drcv`K weĥkĥY Ki : $x^2 + 4x + xy + 4y$

$$\begin{aligned} \text{mgvavb : } x^2 + 4x + xy + 4y \\ &= x(x + 4) + y(x + 4) \\ &= (x + 4)(x + y) \end{aligned}$$

j ħ Kwi : `BĭU iwkĭ Ggbfĥe weĥPb KiĥZ nĥe thb eĤbweĥa cĥqM Kĥi cĥB iwkĭ `BĭU gĥa` GKĭU mvaviY Drcv`K cvĭ qv hvq |

KvR : Drcv` tK wtkH Ki :

$$\begin{array}{lll} 1| 28a + 7b & 2| 15y - 9y^2 & 3| 5a^2b^4 - 9a^4b^2 \\ 4| 2a^2 + 3a + 2ab + 3b & 5| x^4 + 6x^2 + 4x^3 + 24x & \end{array}$$

exRMwZxq mfi i mnnvth` Drcv` tK wtkH :

D`vni Y 26 | Drcv` tK wtkH Ki : $25 - 9x^2$

mgvavb : $25 - 9x^2 = (5)^2 - (3x)^2 = (5 + 3x)(5 - 3x)$

D`vni Y 27 | $8x^4 - 2x^2a^2$ Drcv` tK wtkH Ki |

mgvavb : $8x^4 - 2x^2a^2 = 2x^2(4x^2 - a^2)$ [eEbwea Abjvqx]
 $= 2x^2\{(2x)^2 - (a)^2\} = 2x^2(2x + a)(2x - a)$

D`vni Y 28 | Drcv` tK wtkH Ki : $25(a + 2b)^2 - 36(2a - 5b)^2$

mgvavb : awi , $a + 2b = x$ Ges $2a - 5b = y$

$\therefore c0 \ddot{E} iwk = 25x^2 - 36y^2$
 $= (5x)^2 - (6y)^2$
 $= (5x + 6y)(5x - 6y)$
 $= \{5(a + 2b) + 6(2a - 5b)\}\{5(a + 2b) - 6(2a - 5b)\}$ [x l yGi gvb ewm tq]
 $= (5a + 10b + 12a - 30b)(5a + 10b - 12a + 30b)$
 $= (17a - 20b)(40b - 7a)$

D`vni Y 29 | Drcv` tK wtkH Ki : $x^2 + 5x + 6$

<p>mgvavb : $x^2 + 5x + 6$ $= x^2 + (2 + 3)x + 2 \times 3$ $= (x + 2)(x + 3)$</p>	<p>$\therefore (x + a)(x + b)$ $= x^2 + (a + b)x + ab$ GLvfb, $a = 2$ Ges $b = 3$</p>
--	---

D`vni Y 30 | Drcv` tK wtkH Ki : $4x^2 - 4xy + y^2 - z^2$

mgvavb : $4x^2 - 4xy + y^2 - z^2$
 $= (2x)^2 - 2 \times 2x \times y + (y)^2 - z^2$
 $= (2x - y)^2 - (z)^2$
 $= (2x - y + z)(2x - y - z)$

$$D^{\text{vniY}} 31 | \text{Drcv}^{\text{tK}} \text{w}^{\text{tK}} \text{H} \text{Ki} : 2bd - a^2 - c^2 + b^2 + d^2 + 2ac$$

$$\begin{aligned} \text{mgvavb} : 2bd - a^2 - c^2 + b^2 + d^2 + 2ac \\ &= b^2 + 2bd + d^2 - a^2 + 2ac - c^2 \quad [\text{mvvRtq}] \\ &= (b^2 + 2bd + d^2) - (a^2 - 2ac + c^2) \\ &= (b + d)^2 - (a - c)^2 \\ &= (b + d + a - c)(b + d - a + c) \\ &= (a + b - c + d)(b - a + c + d) \end{aligned}$$

KvR : Drcv^{tK} w^{tK} H Ki :

1 $a^2 - 81b^2$	2 $25x^4 - 36y^4$	3 $9x^2 - (2x + y)^2$
4 $x^2 + 7x + 10$	5 $m^2 + m - 30$	

Abkxj bx 5.3

Drcv^{tK} w^{tK} H Ki :

1 $x^2 + xy + zx + yz$	2 $a^2 + bc + ca + ab$
3 $ab(px + qy) + a^2qx + b^2py$	4 $4x^2 - y^2$
5 $9a^2 - 4b^2$	6 $a^2b^2 - 49y^2$
7 $16x^4 - 81y^4$	8 $a^2 - (x + y)^2$
9 $(2x - 3y + 5z)^2 - (x - 2y + 3z)^2$	10 $4 + 8a^2 + 9a^4$
11 $2a^2 + 6a - 80$	12 $y^2 - 6y - 91$
13 $p^2 - 15p + 56$	14 $45a^8 - 5a^4x^4$
15 $a^2 + 3a - 40$	16 $(x^2 + 1)^2 - (y^2 + 1)^2$
17 $x^2 + 11x + 30$	18 $a^2 - b^2 + 2bc - c^2$
19 $144x^7 - 25x^3a^4$	20 $4x^2 + 12xy + 9y^2 - 16a^2$

5.3 fvR", fvRK, YbxqK I wYZK

x, y I z wZbwU i vnk | awi ,

$$\begin{array}{ccc} x & \div & y \\ \text{fvR}'' & & \text{fvRK} \end{array} = \begin{array}{c} z \\ \text{fvMdj} \end{array}$$

GLv**tb** GKwU fV**M** c0μqv t`Lv**tb**v ntq**t**Q | x tK fV**M** Kiv ntq**t**Q, ZvB x fV**R** | Avevi, y Øviv fV**M** Kiv ntq**t**Q, dtj y fV**RK** Ges z ntjv fV**Mdj** |

thgb, $10 \div 2 = 5$

GLv**tb**, $10 \longrightarrow$ fV**R**

$2 \longrightarrow$ fV**RK**

$5 \longrightarrow$ fV**Mdj**

Gt**¶**t**¶** 10,2 Gi GKwU **WYZK** | Avevi 10,5 Gi I GKwU **WYZK** |

GKwU i**wk** (fV**R**) Ac**i** GKwU i**wk** (fV**RK**) Øviv v**bt**kt**i** v**ef**V**R** ntj, fV**R** tK fV**R** tKi GKwU **WYZK** ((*Multiple*) ejv nq | Avi fV**RK** tK **YbxqK** ev Drcv`K (*Factor*) etj |

5.4 Mwi ô mvavi Y **YbxqK** (M.mv. **W**.)

cwUMwY**Z** t`**t**K Avgiv tR**tb**wQ,

12 Gi **WYbxqK** **W** ntjv 1, **2**, **3**, 4, **6**, 12

18 0 0 1, **2**, **3**, **6**, 9, 18

24 0 0 1, **2**, **3**, 4, **6**, 8, 12, 24

12, 18 | 24 Gi mvavi Y **WYbxqK** **W** ntjv 2, 3 | 6 | Gt`i g**ta** eo **WYbxqK** 6 |

∴ 12, 18 | 24 Gi M.mv. **W**. 6 |

exRMwY**Z**,

xyz Gi **WYbxqK** **W** ntjv h_v**μ**tg **(x)** y, z

$5x$ Gi **WYbxqK** **W** ntjv h_v**μ**tg 5, **(x)**

$3xp$ Gi **WYbxqK** **W** ntjv h_v**μ**tg 3, **(x)** p

∴ $xyz, 5x, 3xp$ i**wk** **W** ntjvi mvavi Y **WYbxqK** x

∴ i**wk** **W** ntjvi M.mv. **W**. x

th i**wk** **W** ev ZtZ**w**aK i**wki** c0Z`KwU **WYbxqK**, H i**wk** tK c0 **W** i**wk** **W** ntjvi mvavi Y **WYbxqK** ejv nq |

W ev ZtZ**w**aK i**wki** Mwi ô mvavi Y **WYbxqK** (M.mv. **W**.) ntjv Ggb GKwU i**wk** hv mvavi Y **WYbxqK** **W** ntjvi g**ta** met**P**tq eo gv**tb**i GKwU i**wk** Ges hv Øviv c0 **W** i**wk** **W** ntjv v**bt**kt**i** v**ef**V**R** nq |

M.mv. **W**. v**W**Y**¶**qi v**W**qg

(K) cwUMwY**Z** i v**W**qtg c0 **W** i**wk** **W** ntjvi mvs**w**L`K mntMi M.mv. **W**. v**W**Y**¶** Ki tZ nte |

(L) exRMwY**Z** i v**W**qtg **W** ntjvi tg**S**ij K Drcv`K tei Ki tZ nte |

(M) mvs**w**L`K mntMi M.mv. **W**. Ges c0 **W** i**wk** **W** ntjvi mte**P** exRMwY**Z** i mvavi Y tg**S**ij K Drcv`K **W** ntjvi avivew**w**K **W** Ydj nt`Q v**W**Y**¶** M.mv. **W**. |

D`vniY 32 | $8x^2yz^2$ Ges $10x^3y^2z^3$ Gi M.mv. . wbyĦ Ki |

mgvavb : $8x^2yz^2 = 2 \times 2 \times 2 \times x \times x \times y \times z \times z$

$$10x^3y^2z^3 = 2 \times 5 \times x \times x \times x \times y \times y \times z \times z \times z$$

mZivs, Ĥ`Lv hvĤ"Q mvaviY .YbxqK ,Ĥj v 2, x, x, y, z, z.

wbĤYĦ M.mv. . $2 \times x \times x \times y \times z \times z = 2x^2yz^2$

D`vniY 33 | $2(a^2 - b^2)$ Ges $(a^2 - 2ab + b^2)$ Gi M.mv. . wbyĦ Ki |

mgvavb : 1g i vĤk = $2(a^2 - b^2) = 2(a+b)(a-b)$

$$2q i vĤk = a^2 - 2ab + b^2 = (a-b)(a-b)$$

GLvĤb mvsuĤĤK mnM 2 I 1 Gi M.mv. . = 1.

Ges mvaviY tgšwĭj K Drcv`K ev .YbxqK $(a-b)$

wbĤYĦ M.mv. . $(a-b)$

D`vniY 34 | $x^2 - 4, 2x + 4$ Ges $x^2 + 5x + 6$ Gi M.mv. . wbyĦ Ki |

mgvavb : 1g i vĤk = $x^2 - 4 = (x+2)(x-2)$

$$2q i vĤk = 2x + 4 = 2(x+2)$$

$$3q i vĤk = x^2 + 5x + 6 = x^2 + 2x + 3x + 6 \\ = x(x+2) + 3(x+2) = (x+2)(x+3)$$

GLvĤb cĦ Ĥ i vĤk ,Ĥj vi mvsuĤĤK mnM 1, 2 Ges 1 Gi M.mv. . = 1

mvaviY tgšwĭj K Drcv`K = $(x+2)$

wbĤYĦ M.mv. . $1 \times (x+2) = (x+2)$

KvR : M.mv. . wbyĦ Ki :

$$1 | 3x^3y^2, 2x^2y^3$$

$$2 | 3xy, 6x^2y, 9xy^2$$

$$3 | (x^2 - 25), (x-5)^2$$

$$4 | x^2 - 9, x^2 + 7x + 12, 3x + 9$$

5.5 j wNô mvaviY .wYZK (j .mv. .)

cwĤJwYĤZ Avgiv Rwb,

4 Gi .wYZK ,Ĥj v nĤ"Q 4, 8, 12, 16, 20, 24, 28, 32, 36,

6 0 0 0 6, 12, 18, 24, 30, 36,

4 Ges 6 Gi mvaviY .wYZK nĤ"Q 12, 24, 36,

4 Ges 6 Gi j wNô mvaviY .wYZK nĤ"Q 12.

β ev ZtZwaK msL vi j .mv. . nt"Q Ggb GKw msL v hv c0 E msL v ,tj vi mvavi Y ,wYZK ,tj vi gta metPtq tQvU|

exRMwYZxq iwk i t t t ,

$$x^2 y^2 \div x^2 y = y$$

$$\text{Ges } x^2 y^2 \div xy^2 = x$$

A_φ, $x^2 y$ | xy^2 Gi c0Z K w 0viv $x^2 y^2$ wbtktl wfvR |

mZivs, $x^2 y^2$ ntj v $x^2 y$ | xy^2 Gi GKw mvavi Y ,wYZK |

$$\text{Avevi, } x^2 y = x \times x \times y$$

$$xy^2 = x \times y \times y$$

GLvfb iwk βwUz x AvtQ mtePP βevi Ges y AvtQ mtePP βevi |

$$\therefore j .mv. . = x \times x \times y \times y = x^2 y^2$$

gše : j .mv. . = mvavi Y Drcv`K × mvavi Y bq Gifc Drcv`K |

β ev ZtZwaK iwk mte mKj Drcv`tKi mtePP NvtZi ,Ydj tK iwk ,tj vi j wN0 mvavi Y ,wYZK (j .mv. .) ej v nq|

j .mv. . wBYqi wbgq

j .mv. . wBYq Kivi Rb c0tg mvsL`K mnM ,tj vi j .mv. . tei Ki tZ nte | Gici Drcv`tKi mtePP NvZ tei Ki tZ nte | AZtci Dftqi ,Ydj B nte c0 E iwk ,tj vi j .mv. . |

D`vniY 35 | $4x^2 y^3 z$, $6xy^3 z^2$ Ges $8x^3 yz^3$ Gi j .mv. . wBYq Ki |

mgvavb : iwk ,tj vi mvsL`K mnM 4, 6 | 8 Gi j .mv. . 24

c0 E iwk ,tj vi Ašf x, y, z Drcv`K ,tj vi mtePP NvZ h_vutg x^3 , y^3 | z^3

wbtYq j .mv. . $24x^3 y^3 z^3$

D`vniY 36 | $a^2 - b^2$ | $a^2 + 2ab + b^2$ Gi j .mv. . wBYq Ki |

mgvavb : 1g iwk = $a^2 - b^2 = (a + b)(a - b)$

$$2q iwk = a^2 + 2ab + b^2 = (a + b)^2$$

c0 E iwk ,tj vi mte Drcv`K ,tj vi mtePP NvZ $(a - b)$ | $(a + b)^2$

wbtYq j .mv. . $(a - b)(a + b)^2$

D`vniY 37 | $2x^2 y + 4xy^2$, $4x^3 y - 16xy^3$ Ges $5x^2 y^2 (x^2 + 4xy + 4y^2)$ Gi j .mv. . wBYq Ki |

mgvavb : 1g iwk = $2x^2 y + 4xy^2 = 2xy(x + 2y)$

$$2q iwk = 4x^3 y - 16xy^3 = 4xy(x^2 - 4y^2) = 4xy(x + 2y)(x - 2y)$$

$$3q \text{ i} \text{v} \text{k} = 5x^2y^2(x^2 + 4xy + 4y^2) = 5x^2y^2(x + 2y)^2$$

mvsuL K mnM 2, 4 I 5 Gi j .mv. 20

cĥ Ē i v k , t j v t Z m e Drcv` K , t j v i m t e P P NvZ h _ v t g $x^2, y^2, (x + 2y)^2, (x - 2y)$

wb t Y q j .mv. 20 $x^2y^2(x - 2y)(x + 2y)^2$

KvR : j .mv. wbYq Ki :

$$1 | 3x^2y^3, 9x^3y^2 | 12x^2y^2$$

$$2 | 3a^2 + 9, a^4 - 9 | a^4 + 6a^2 + 9$$

$$3 | x^2 + 10x + 21, x^4 - 49x^2$$

$$4 | a - 2, a^2 - 4, a^2 - a - 2$$

Abkxj bx 5.4

1 | 11 Gi eMqKZ ?

(K) 22

(L) 101

(M) 111

(N) 121

2 | $a - 5$ Gi eMqKvbW ?

(K) $a^2 + 10a + 25$ (L) $a^2 - 10a + 25$ (M) $a^2 + 5a + 25$ (N) $a^2 - 5a + 25$

3 | $(2x + 3) | (2x - 3)$ Gi ,Ydj KZ ?

(K) $4x^2 - 9$ (L) $4x^2 + 12x - 9$ (M) $4x^2 - 12x - 9$ (N) $4x^2 + 9$

4 | $(x + y)^2 + 2(x + y)(x - y) + (x - y)^2$ Gi gvb tKvbW ?

(K) $8x^2$

(L) $8y^2$

(M) $4x^2$

(N) $4y^2$

5 | $a + b = 4$ Ges $a - b = 2$ ntj , ab Gi gvb KZ ?

(K) 3

(L) 8

(M) 12

(N) 16

6 | GKw i v k Aci GKw i v k Øviv wbt t k t l w e f v R ntj , f v R t K f v R t K i K x e j v n q ?

(K) f v M d j

(L) f v M t k l

(M) , w Y Z K

(N) , Y b x q K

7 | $a, a^2, a(a + b)$ Gi j w N o m v a v i Y , w Y Z K t K v b W ?

(K) a

(L) a^2

(M) $a(a + b)$

(N) $a^2(a + b)$

8 | $2a | 3b$ Gi M .mv. KZ ?

(K) 1

(L) 6

(M) a

(N) b

9 | (i) $(a + b)^2 = a^2 + 2ab + b^2$

$$(ii) 4ab = (a+b)^2 + (a-b)^2$$

$$(iii) a^2 - b^2 = (a+b)(a-b)$$

Dctii Zt_ i wfvE tZ wbtPi tKvbwU mwVK ?

(K) i | ii

(L) i | iii

(M) ii | iii

(N) i, ii | iii

10| (i) j .mv. . Gi cYqfc ntj v j wNô mvavi Y wYZK

(ii) j .mv. . wYq i Rb i wvk t j vi mvavi Y wYZK wYq Ki tZ nq |

(iii) M.mv. . Gi cYqfc ntj v Mwi ô mvavi Y wYZK

Dctii Zt_ i wfvE tZ wbtPi tKvbwU mwVK ?

(K) i | ii

(L) i | iii

(M) ii | iii

(N) i, ii | iii

11| (i) $x^2 - 16$ (ii) $x^2 + 3x - 4$ `BwU exRMwYwZK i wvk—

(1) $x = 1$ ntj , (i) | (ii) Gi Aš t wbtPi tKvbwU ?

(K) 0

(L) -15

(M) 15

(N) 16

(2) (ii) Gi Drcv tK wtkwZ i fc wbtPi tKvbwU ?

(K) $(x-1)(x+4)$

(L) $(x+1)(x-4)$

(M) $(-x+1)(x+4)$

(N) $(-x+1)(4-x)$

(3) (i) | (ii) Gi mvavi Y Drcv K wbtPi tKvbwU ?

(K) $(x-4)$

(L) $(x-1)$

(M) $(x+1)$

(N) $(x+4)$

12| $(x^3y - xy^3) | (x-y)(x+2y)$ `BwU exRMwYwZxq i wvk | Zvntj ,

(1) cŭg i wvki Drcv tK wtkwZ i fc wbtPi tKvbwU?

(K) $(x+y)(x-y)$

(L) $x(x+y)(x-y)$

(M) $y(x+y)(x-y)$

(N) $xy(x+y)(x-y)$

(2) exRMwYwZK i wvk `BwU i M.mv. . wbtPi tKvbwU ?

(K) $(x+y)$

(L) $(x-y)$

(M) $y(x+y)$

(N) $x(x-y)$

(3) exRMwYwZK i wvk `BwU i j .mv. . wbtPi tKvbwU ?

(K) $x(x+y)(x-y)$

(L) $y(x+y)(x-y)$

(M) $xy(x^2 - y^2)(x+2y)$

(N) $xy(x+y)(x+2y)$

M.mv. 3. wbyġ Ki (13 – 22) :

13| $3a^3b^2c, 6ab^2c^2$

14| $5ab^2x^2, 10a^2by^2$

15| $3a^2x^2, 6axy^2, 9ay^2$

16| $16a^3x^4y, 40a^2y^3x, 28ax^3$

17| $a^2 + ab, a^2 - b^2$

18| $x^3y - xy^3, (x-y)^2$

19| $x^2 + 7x + 12, x^2 + 9x + 20$

20| $a^3 - ab^2, a^4 + 2a^3b + a^2b^2$

21| $a^2 - 16, 3a + 12, a^2 + 5a + 4$

22| $xy - y, x^3y - xy, x^2 - 2x + 1$

j .mv. 3. wbyġ Ki (23 – 32) :

23| $6a^3b^2c, 9a^4bd^2$

24| $5x^2y^2, 10xz^3, 15y^3z^4$

25| $2p^2xy^2, 3pq^2, 6pqx^2$

26| $(b^2 - c^2), (b+c)^2$

27| $x^2 + 2x, x^2 + 3x + 2$

28| $9x^2 - 25y^2, 15ax - 25ay$

29| $x^2 - 3x - 10, x^2 - 10x + 25$

30| $a^2 - 7a + 12, a^2 + a - 20, a^2 + 2a - 15$

31| $x^2 - 8x + 15, x^2 - 25, x^2 + 2x - 15$

32| $x + 5, x^2 + 5x, x^2 + 7x + 10$

33| $a = 2x - 3$ Ges $b = 2x + 5$ ntj -

(K) $a + b$ Gi gvb wbyġ Ki |

(L) mġġi mvinth² a^2 Gi gvb wbyġ Ki |

(M) mġġi mvinth² a I b Gi 3Ydj wbyġ Ki | $x = 2$ ntj , $ab = KZ$?

34| $x^4 - 625$ Ges $x^2 + 3x - 10$ `BwU exRMWZxq i vnk | Zvntj -

(K) cġg i vnkġK Drcv`ġK wġkġY KiġZ ntj , ġKvb mġwU e`envi KiġZ nte ?

(L) wġZxq i vnkġK Drcv`ġK wġkġY Ki |

(M) i vnk `BwU i M.mv. 3. wbyġ Ki |

(N) i vnk `BwU j .mv. 3. wbyġ Ki |

I ô Aa"vq exRMwYZxq fMusk

fMusk A_©fvOv Ask| Avgiv ``bw`b Rxeþb GKwU mæúY©wRwbþmi mvþ_ Gi AskI e"envi Kwi | ZvB fMusk, MwþZi GKwU Acwivnh©elq| cwUMwYZxq fMuskþi gþZv exRMwYZxq fMuskþI j NþKiY I mvaviY niwewkóKiY ,iþþY©fþgKv ivþL| cwUMwYZxq fMuskþi AþbK RwUj mgm"v exRMwYZxq fMuskþi gra"tg mnþR mgvavb Kiv hvq| KvþRB wkwþv_þ i exRMwYZxq fMusk mæúþK©mý úó aviYv _vKv cþqþRb| G Aa"vq exRMwYZxq fMuskþi j NþKiY, mvaviY niwewkóKiY Ges thvM I wewqvm Dc"vcb Kiv ntqþQ|

Aa"vq þkþI wkwþv_þv –

- exRMwYZxq fMusk Kx Zv e"vL"v KiþZ cviþe|
- exRMwYZxq fMuskþi j NþKiY I mvaviY niwewkóKiY KiþZ cviþe|
- exRMwYZxq fMuskþi thvM, wewqvm I mij xKiY KiþZ cviþe|

6.1 fMusk

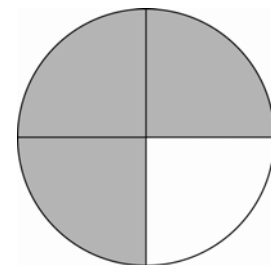
Awei GKwU Avtcj mgvb `þfvþM fvM Kþi GK fvM Zvi fvB KweiþK w`j | Zvntj `þ fvBtqi cþZþK tcj Avtcj wUi AtaR, A_þ ½ Ask| GB ½ GKwU fMusk|

Avevi aiv hvK, wUbv GKwU eþËi 4 fvþMi 3 fvM Kvþjv is Kiþjv| Zvntj , Zvi is Kiv ntjv mæúY©eþwUi

$\frac{3}{4}$ Ask| GLvþb $\frac{1}{2}$, $\frac{3}{4}$ G,þjv cwUMwYZxq fMusk hvþ`i je 1, 3 Ges ni 2,

4| hw` þKvþbv fMuskþi i'ayje ev i'ayni ev je I ni DfqþK exRMwYZxq cþZxK ev iwkw Øriv cþKvK Kiv nq, Zþe Zv nþe exRMwYZxq fMusk| thgb,

$\frac{a}{4}, \frac{5}{b}, \frac{a}{b}, \frac{2a}{a+b}, \frac{a}{5x}, \frac{x}{x+1}, \frac{2x+1}{x-3}$, BZ"vw` exRMwYZxq fMusk|



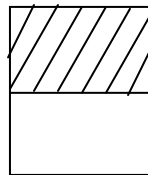
6.2 mgZj fMusk :

j 9 Kwi, `BwU mgvb eMvKvi t9t1i 1bs wP1 `B fvtMi GK

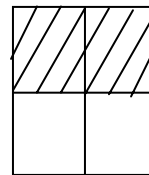
fVM, A_ 1/2 Ask Kvjv is Kiv ntqtQ Ges 2bs wP1 Pvi

fvtMi `B fVM, A_ 2/4 Ask Kvjv is Kiv ntqtQ | wKŠ' t`Lv

hvq, `B wP1i tgvU Kvjv is Kiv Ask mgvb |



1bs wP1



2bs wP1

AZGe, Avgiv wj LtZ cwi, $\frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}$; Avevi, $\frac{1}{2} = \frac{1 \times 3}{2 \times 3} = \frac{3}{6}$

Gfvt, $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{5}{10} = \dots\dots\dots$, G,tjv ci`ui mgZj fMusk |

GKBfvt exRMmYZxq fMusk i t9t1, $\frac{a}{b} = \frac{a \times c}{b \times c} = \frac{ac}{bc}$ [je l niK c 0viv ,Y Kti, $c \neq 0$]

Avevi, $\frac{ac}{bc} = \frac{ac \div c}{bc \div c} = \frac{a}{b}$ [je l niK c 0viv fVM Kti, $c \neq 0$]

$\therefore \frac{a}{b}$ Ges $\frac{ac}{bc}$ ci`ui mgZj fMusk |

j 9Yxq th, tKvfv fMusk i je l niK kb` Qvov GKB iwk 0viv ,Y ev fVM Kti, fMusk i gvbi tKvfv cwi eZB nq bv |

KvR : $\frac{2}{5}$ Ges $\frac{a}{x}$ Gi wZwU Kti mgZj fMusk tj L |

6.3 fMusk i jNKiY

wbtPi Lwvj Ni,tjv c+Y Ki (`BwU Kti t`Lvfv ntjv) :

$\frac{9}{12} = \frac{3 \times 3}{2 \times 2 \times 3} = \frac{3}{4}$	$\frac{2^3}{2^4} =$
$\frac{a^2b}{ab^2} =$	$\frac{x^3}{x^2} = \frac{x \times x \times x}{x \times x} = x$
$\frac{3x}{6xy} =$	$\frac{2mn}{4m^2} =$

tKvfbv fMstki j NkiYi A_{ntj} v fMskwtk j wNô AvKvîi cwiYZ Kiv | G Rb" je I niTK Gt`i
mviY ,YbxqK ev Drcv`K Øiv fM Kiv nq | tKvfbv fMstki je I ntii gta" tKvfbv mviY ,YbxqK
ev Drcv`K bv vKtj Gifc fMstK j wNô AvKvîi fMsk ejv nq |

$$D`vniY 1 | \frac{4a^2bc}{6ab^2c} \text{ tK j NkiY Ki |}$$

$$\text{mgvavb : } \frac{4a^2bc}{6ab^2c} = \frac{2 \times 2 \times a \times a \times b \times c}{2 \times 3 \times a \times b \times b \times c} = \frac{2a}{3b}.$$

$$\text{weKí c} \times \text{wZ : } \frac{4a^2bc}{6ab^2c} = \frac{2abc \times 2a}{2abc \times 3b} = \frac{2a}{3b}. [\text{je I ntii M.mv.} \therefore 2abc]$$

$$D`vniY 2 | \frac{2a^2+3ab}{4a^2-9b^2} \text{ tK j wNô AvKvîi cwiYZ Ki |}$$

$$\begin{aligned} \text{mgvavb : } \frac{2a^2+3ab}{4a^2-9b^2} &= \frac{2a^2+3ab}{(2a)^2-(3b)^2} \\ &= \frac{a(2a+3b)}{(2a+3b)(2a-3b)} = \frac{a}{2a-3b}. \left[\because x^2-y^2 = (x+y)(x-y) \right] \end{aligned}$$

$$D`vniY 3 | \text{ j NkiY Ki : } \frac{x^2+5x+6}{x^2+3x+2}$$

$$\begin{aligned} \text{mgvavb : } \frac{x^2+5x+6}{x^2+3x+2} &= \frac{x^2+2x+3x+6}{x^2+x+2x+2} \\ &= \frac{x(x+2)+3(x+2)}{x(x+1)+2(x+1)} = \frac{(x+2)(x+3)}{(x+1)(x+2)} = \frac{x+3}{x+1}. \end{aligned}$$

6.4 mviY niwekó fMsk

mviY niwekó fMstK mgniwekó fMskl etj | Gtqî cðË fMsk,tjvi ni mgvb Kitz nq |

$$\frac{a}{2b} \text{ | } \frac{m}{3n} \text{ fMsk } \text{ } \text{Bw} \text{ wetePbv Kwi | fMsk } \text{ } \text{Bw} \text{ ni } 2b \text{ Ges } 3n \text{ Gi j .mv.} \therefore 6bn.$$

AZGe, `Bw fMstkiB ni 6bn Kitz nte |

$$\begin{aligned} \text{GLvfb, } \frac{a}{2b} &= \frac{a \times 3n}{2b \times 3n} \left[\because 6bn \div 2b = 3n \right] \\ &= \frac{3an}{6bn} \end{aligned}$$

$$\begin{aligned} \text{Ges } \frac{5}{a^2 + 3a - 10} &= \frac{5}{(a-2)(a+5)} = \frac{5 \times (a+2)}{(a-2)(a+5) \times (a+2)} \quad \begin{array}{l} \text{[je l ni\#K (a+2)} \\ \text{\#v iv ,Y K\#i]} \end{array} \\ &= \frac{5(a+2)}{(a^2 - 4)(a+5)} \end{aligned}$$

$$\therefore \text{wb\#Y\# fMusk } \text{\#Bw} \frac{2(a+5)}{(a^2 - 4)(a+5)} + \frac{5(a+2)}{(a^2 - 4)(a+5)}$$

D`vniY 6 | mvaviY ni wewkó fMusk cwiYZ Ki :

$$\frac{1}{x^2 + 3x} + \frac{2}{x^2 + 5x + 6} + \frac{3}{x^2 - x - 12}$$

$$\text{mgvavb : } 1\text{g fMusk ni} = x^2 + 3x = x(x+3)$$

$$\begin{aligned} 2\text{q fMusk ni} &= x^2 + 5x + 6 = x^2 + 2x + 3x + 6 \\ &= x(x+2) + 3(x+2) = (x+2)(x+3) \end{aligned}$$

$$\begin{aligned} 3\text{q fMusk ni} &= x^2 - x - 12 = x^2 + 3x - 4x - 12 \\ &= x(x+3) - 4(x+3) = (x+3)(x-4) \end{aligned}$$

$$\text{ni wZbwUi j .mv. ,. } x(x+2)(x+3)(x-4)$$

$$\therefore 1\text{g fMusk} = \frac{1}{x^2 + 3x} = \frac{1 \times (x+2)(x-4)}{x(x+3) \times (x+2)(x-4)} = \frac{(x+2)(x-4)}{x(x+2)(x+3)(x-4)}$$

$$\begin{aligned} 2\text{q fMusk} &= \frac{2}{x^2 + 5x + 6} = \frac{2}{(x+2)(x+3)} = \frac{2 \times x(x-4)}{(x+2)(x+3) \times x(x-4)} \\ &= \frac{2x(x-4)}{x(x+2)(x+3)(x-4)} \end{aligned}$$

$$\begin{aligned} 3\text{q fMusk} &= \frac{3}{x^2 - x - 12} = \frac{3}{(x+3)(x-4)} = \frac{3 \times x(x+2)}{(x+3)(x-4) \times x(x+2)} \\ &= \frac{3x(x+2)}{x(x+2)(x+3)(x-4)}. \end{aligned}$$

$$\therefore \text{wb\#Y\# fMusk wZbwUi h_v\#t\#g}$$

$$\frac{(x+2)(x-4)}{x(x+2)(x+3)(x-4)} + \frac{2x(x-4)}{x(x+2)(x+3)(x-4)} + \frac{3x(x+2)}{x(x+2)(x+3)(x-4)}.$$

ԿՐՐ :

1| Ըրժժիճ ԿՐՐ Կի : $a^2 - 9b^2, x^2 + x - 6$.

2| իմ ԿՐՐ Կի : $a^2 + 3a, a^2 + 5a + 6, a^2 - a - 12$.

3| մասնակցության փուլի ԿՐՐ Կի : $\frac{a}{2x}, \frac{b}{4y}$

Աղյուսակ 6.1

1-10 թվերի ԿՐՐ Կի (1-10) :

1| $\frac{a^2b}{a^3c}$ 2| $\frac{a^2bc}{ab^2c}$ 3| $\frac{x^3y^3z^3}{x^2y^2z^2}$ 4| $\frac{x^2+x}{xy+y}$ 5| $\frac{4a^2b}{6a^3b}$ 6| $\frac{2a-4ab}{1-4b^2}$

7| $\frac{2a+3b}{4a^2-9b^2}$ 8| $\frac{a^2+4a+4}{a^2-4}$ 9| $\frac{x^2-y^2}{(x+y)^2}$ 10| $\frac{x^2+2x-15}{x^2+9x+20}$

11-20 թվերի ԿՐՐ Կի (11-20) :

11| $\frac{a}{bc}, \frac{a}{ac}$ 12| $\frac{x}{pq}, \frac{y}{pr}$ 13| $\frac{2x}{3m}, \frac{3y}{2n}$ 14| $\frac{a}{a-b}, \frac{b}{a+b}$

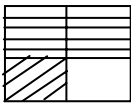
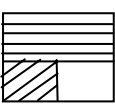
15| $\frac{x^2}{a^2-2ab}, \frac{y^2}{a+2b}$ 16| $\frac{3}{a^2-4}, \frac{2}{a(a+2)}$ 17| $\frac{a}{a^2-9}, \frac{b}{a+3}$

18| $\frac{a}{a+b}, \frac{b}{a-b}, \frac{c}{a-c}$ 19| $\frac{a}{a-b}, \frac{b}{a+b}, \frac{c}{a(a+b)}$

20| $\frac{2}{x^2-x-2}, \frac{3}{x^2+x-6}$

6.5 exRMwZxq fMus̄tki thvM, wētqvM I mijxKiY

j 9̄ Kiwi :

পাটিগণিত	exRMwZ
<p>m̄uȲeM̄K̄vi t̄9̄T̄w̄t̄K 1 aiv ntj , Gi</p> <p>Kv̄tj v Ask = 1 Gi $\frac{2}{4} = \frac{2}{4}$ </p> <p>v̄MUv̄v Ask = 1 Gi $\frac{1}{4} = \frac{1}{4}$</p> <p>∴ tgv̄U is Kiv Ask = $\boxed{\frac{2}{4} + \frac{1}{4}}$</p> <p>$= \frac{2+1}{4} = \frac{3}{4}$</p> <p>∴ mv̄ v Ask = $\left(1 - \frac{3}{4}\right) = \boxed{\frac{4}{4} - \frac{3}{4}}$</p> <p>$= \frac{4-3}{4} = \frac{1}{4}$</p>	<p>m̄uȲeM̄K̄vi t̄9̄T̄w̄t̄K x aiv ntj , Gi</p> <p> Kv̄tj v Ask = x Gi $\frac{2}{4} = \frac{2x}{4}$</p> <p>v̄MUv̄v Ask = x Gi $\frac{1}{4} = \frac{x}{4}$</p> <p>∴ tgv̄U is Kiv Ask = $\boxed{\frac{2x}{4} + \frac{x}{4}}$</p> <p>$= \frac{2x+x}{4} = \frac{3x}{4}$</p> <p>∴ mv̄ v Ask = $x - \frac{3x}{4} = \boxed{\frac{4x}{4} - \frac{3x}{4}}$</p> <p>$= \frac{4x-3x}{4} = \frac{x}{4}$</p>

j 9̄ Kiwi , c̄iZ̄w̄ N̄ti i fMus̄k̄,tj v mv̄viY ni w̄ekó |

exRMwZxq fMus̄tki thvM I wētqv̄Mi w̄bqg :

- (1) fMus̄k̄,tj v̄K j w̄Nô mv̄viY ni w̄ekó Ki t̄Z n̄te |
- (2) thv̄Md̄tj i ni n̄te j w̄Nô mv̄viY ni Ges j e n̄te i f̄cv̄š̄w̄i Z fMus̄k̄,tj vi j t̄ei thv̄Md̄j |
- (3) wētqv̄Md̄tj i ni n̄te j w̄Nô mv̄viY ni Ges j e n̄te i f̄cv̄š̄w̄i Z fMus̄k̄,tj vi j t̄ei wētqv̄Md̄j |

exRMwZxq fMus̄tki thvM

D̄v̄niY 7 | thv̄M Ki : $\frac{x}{a}$ Ges $\frac{y}{a}$

mgv̄av̄b : $\frac{x}{a} + \frac{y}{a} = \frac{x+y}{a}$

D̄v̄niY 8 | $\frac{a}{m}$ Ges $\frac{b}{n}$ thv̄M Ki |

mgv̄av̄b : $\frac{a}{m} + \frac{b}{n} = \frac{a \times n}{m \times n} + \frac{b \times m}{n \times m}$

$= \frac{an + bm}{mn}$

D`vni Y 9 | thvMdj wbYq Ki : $\frac{3a}{2x} + \frac{b}{2y}$.

mgvarb : $\frac{3a}{2x} + \frac{b}{2y} = \frac{3a \times y}{2x \times y} + \frac{b \times x}{2y \times x} = \frac{3ay + bx}{2xy}$ [mgnti i Rb`2x,2yGi j .mv. .
2xy wbtq]

exRMWZxq fMstki wbtqM

D`vni Y 10 | wbtqM Ki : $\frac{a}{x} - \frac{b}{x}$

mgvarb : $\frac{a}{x} - \frac{b}{x} = \frac{a-b}{x}$

D`vni Y 11 | $\frac{2a}{3x} - \frac{b}{3y}$ wbtqM Ki |

mgvarb : $\frac{2a}{3x} - \frac{b}{3y} = \frac{2a \times y}{3xy} - \frac{b \times x}{3xy} = \frac{2ay - bx}{3xy}$

D`vni Y 12 | wbtqMdj wbYq Ki : $\frac{1}{a+2} - \frac{1}{a^2-4}$.

mgvarb : $\frac{1}{a+2} - \frac{1}{a^2-4} = \frac{1}{a+2} - \frac{1}{(a+2)(a-2)} = \frac{1 \times (a-2)}{(a+2) \times (a-2)} - \frac{1}{(a+2)(a-2)}$
 $= \frac{(a-2)-1}{(a+2)(a-2)} = \frac{a-2-1}{(a+2)(a-2)} = \frac{a-3}{a^2-4}$.

KvR : wbtPi QKw ciY Ki :	
$\frac{1}{5} + \frac{3}{5} =$	$\frac{4}{5} - \frac{2}{5} =$
$\frac{3}{m} + \frac{2}{n} =$	$\frac{5}{ab} - \frac{1}{a} =$
$\frac{2}{x} + \frac{5}{2x} =$	$\frac{7}{xyz} - \frac{2z}{xy} =$
$\frac{3}{m} + \frac{2}{m^2} =$	$\frac{5}{p^2} - \frac{2}{3p} =$

exRMWZxq fMus†ki mij xKiY :

côuqv wPy ðviv mshy³ `ß ev Z†ZwaK exRMWZxq fMus†K GKwU fMus†k ev iwktZ cwiYZ KivB ntjv fMus†ki mij xKiY | G†Z cßB fMuskuU†K j wNô AvKv†i cKvk Kiv nq|

D`vniY 13 | mij Ki : $\frac{a}{a+b} + \frac{b}{a-b}$.

mgvarb : $\frac{a}{a+b} + \frac{b}{a-b} = \frac{a \times (a-b) + b \times (a+b)}{(a+b)(a-b)} = \frac{a^2 - ab + ab + b^2}{(a+b)(a-b)}$
 $= \frac{a^2 + b^2}{a^2 - b^2}$.

D`vniY 14 | mij Ki : $\frac{x+y}{xy} - \frac{y+z}{yz}$.

mgvarb : $\frac{x+y}{xy} - \frac{y+z}{yz} = \frac{z \times (x+y) - x \times (y+z)}{xyz} = \frac{zx + zy - xy - xz}{xyz}$
 $= \frac{yz - xy}{xyz} = \frac{y(z-x)}{xyz} = \frac{z-x}{xz}$.

D`vniY 15 | mij Ki : $\frac{x-y}{xy} + \frac{y-z}{yz} - \frac{z-x}{zx}$

mgvarb : $\frac{x-y}{xy} + \frac{y-z}{yz} - \frac{z-x}{zx} = \frac{(x-y) \times z + (y-z) \times x - (z-x) \times y}{xyz}$
 $= \frac{zx - yz + xy - zx - yz + xy}{xyz} = \frac{2xy - 2yz}{xyz} = \frac{2y(x-z)}{xyz} = \frac{2(x-z)}{xz}$

Abkxj bx 6.2

1 | $\frac{ab}{xy}$ Gi mgZj fMus†k w†Pi †Kvbw ?

(K). $\frac{abc}{xyz}$

(L). $\frac{a^2b}{x^2y}$

(M). $\frac{abz}{xyz}$

(N). $\frac{a}{x}$

2| $\frac{2x + x^2}{6x}$ Gi j wNô AvKvi wb̂Pi tKvbW ?

(K). $\frac{1}{3}$ (L). $\frac{2+x}{6}$ (M). $\frac{x}{6}$ (N). $\frac{1+x}{3}$

3| $\frac{2}{3a} \mid \frac{3}{5ab}$ Gi mgniwekó fMusk wb̂Pi tKvbW ?

(K). $\frac{10b}{15ab}, \frac{9}{15ab}$ (L). $\frac{6}{15ab}, \frac{b}{15ab}$ (M). $\frac{2}{15ab}, \frac{3}{15ab}$ (N). $\frac{10a}{15a^2b}, \frac{9a}{15a^2b}$

4| $\frac{x}{yz} \mid \frac{y}{zx}$ Gi mvaviY niwekó fMusk wb̂Pi tKvbW ?

(K). $\frac{zx^2}{xyz^2}, \frac{y^2z}{xyz^2}$ (L). $\frac{x^2}{xyz^2}, \frac{y^2}{xyz^2}$ (M). $\frac{x}{xyz}, \frac{y}{xyz}$ (N). $\frac{x^2}{xyz}, \frac{y^2}{xyz}$

5| wb̂Pi Z₂ t̂j v j ¶ Ki :

i. $\frac{ac}{bd} + 1 = \frac{ac+1}{bd+1}$; ii. $\frac{a}{2b} + \frac{a}{4b} = \frac{3a}{4b}$; iii. $\frac{3x}{y} - \frac{2x}{5y} = \frac{13x}{5y}$

Dct̂i i Z₂ i Avt̂j v̂K wb̂Pi tKvbW mZ ?

(K). i l ii (L). ii l iii (M). i l iii (N). i, ii l iii

6| $\frac{a}{x+1}, \frac{a}{2x+2}, \frac{3a}{x^2-1}$ wZbW exRMwYXq fMusk |

wb̂Pi ĉk̂t̂j vi DĖi `vl :

(1) 1g fMusk t̂t̂K 2q fMusk wet̂qvM Ki t̂j wet̂qvM̂d̂j wb̂Pi tKvbW ?

(K). $\frac{1}{2x+2}$ (L). $\frac{2a}{x+2}$ (M). $\frac{a}{x+1}$ (N). $\frac{a}{2(x+1)}$

(2) ni wZbW i j .mv. . wb̂Pi tKvbW ?

(K). $2(x^2-1)$ (L). $(x+1)^3(x-1)$ M. $2(x^2+1)$ (N). $2(x+1)$

(3) fMusk wZbW t̂K mgniwekó fMusk̂k̂ i f̂v̂š̂t̂ Ki t̂j 2q fMusk̂W K̂x n̂t̂e?

$$K. \frac{a}{2(x^2-1)} \quad L. \frac{a(x-1)}{2(x^2-1)} \quad M. \frac{a(x-1)}{2(x+1)} \quad N. \frac{2a(x-1)}{x^2-1}$$

thvMdj wbyq Ki (7-12) :

$$7| \frac{3a}{5} + \frac{2b}{5} \quad 8| \frac{1}{5x} + \frac{2}{5x} \quad 9| \frac{x}{2a} + \frac{y}{3b} \quad 10| \frac{2a}{x+1} + \frac{2a}{x-2} \quad 11| \frac{a}{a+2} + \frac{2}{a-2}$$

$$12| \frac{3}{x^2-4x-5} + \frac{4}{x+1}$$

weqvmMdj wbyq Ki (13-18) :

$$13| \frac{2a}{7} - \frac{4b}{7} \quad 14| \frac{2x}{5a} - \frac{4y}{5a} \quad 15| \frac{a}{8x} - \frac{b}{4y}$$

$$16| \frac{3}{x+3} - \frac{2}{x+2} \quad 17| \frac{p+q}{pq} - \frac{q+r}{qr} \quad 18| \frac{2x}{x^2-4y^2} - \frac{x}{xy+2y^2}$$

mij Ki : (19-24) :

$$19| \frac{5}{a^2-6a+5} + \frac{1}{a-1} \quad 20| \frac{1}{x+2} - \frac{1}{x^2-4} \quad 21| \frac{a}{3} + \frac{a}{6} - \frac{3a}{8}$$

$$22| \frac{a}{b} - \frac{3a}{2b} + \frac{2a}{3b} \quad 23| \frac{x}{yz} - \frac{y}{zx} + \frac{z}{xy} \quad 24| \frac{x-y}{xy} + \frac{y-z}{yz} + \frac{z-x}{zx}$$

$$25| \text{wZbiU exRMwYZxq fMusK} : \frac{x}{x+y}, \frac{x}{x-4y}, \frac{y}{x^2-3xy-4y^2}$$

K. 3q fMusiki ni tK Drcv` tK wetkH Ki |

L. 1g I 2q fMusik mgnienkó fMusik cKvk Ki |

M. fMusik wZbiUi thvMdj wbyq Ki |

$$26| \text{wZbiU exRMwYZxq fMusK} : \frac{1}{a(a+2)}, \frac{1}{a^2+5a+6}, \frac{1}{a^2-a-6}$$

K. 3q fMusiki ni tK Drcv` tK wetkH Ki |

L. 2q I 3q fMusik mvaviY ni enkó fMusik i/cvšt Ki |

M. 2q I 3q fMusiki thvMdj t tK 1g fMusik wetqM Ki |

mßg Aa"vq

mij mgxKi Y

Avgiv lô tkîYtZ mgxKiY I mij mgxKiY Kx Zv tRtbw Ges ev⁻ewfE⁺K mgm^{iv} t₋tK mgxKiY MVb Kti
Zv mgravb Kitz wkLwQ mBg tkîYi G Aa^{vtq} Avgiv mgxKiY mgravtbi wKQwewa I Gtⁱ cöqM m^{au}tK[©]
Rvbe Ges ev⁻e mgm^{vi} wfE⁺tZ mgxKiY MVb Kti Zv mgravb Kiv wkLe| G QrovI G Aa^{vtq} tj LwPÎ
m^{au}tK[©]cö_{wg}K aviYv t⁻l qv ntqtQ Ges mgxKiYi mgravb tj LwPÎ t⁻Lvbn ntqtQ|

Aa"vq tk†l wk¶v_xl v -

- $mgxKi\ddot{Y}i\ c\dot{\eta}\dot{v}\dot{s}\dot{t}\ \dot{w}e\dot{a},\ eR\dot{B}\ \dot{w}e\dot{a},\ A\dot{v}\dot{o},\ Y\dot{b}\ \dot{w}e\dot{a},\ c\ddot{a}Zm\dot{v}g\dot{v}\ \dot{w}e\dot{a}\ e\ddot{v}L\ddot{v}\ Ki\ddot{t}Z\ cvi\ \dot{t}e|$
- $mgxKi\ddot{Y}i\ \dot{w}e\dot{a}m\dot{g}\dot{n}\ c\ddot{a}q\dot{M}\ K\dot{t}i\ mgxKi\dot{Y}\ m\dot{g}v\dot{a}b\ Ki\ddot{t}Z\ cvi\ \dot{t}e|$
- $mij\ mgxKi\dot{Y}\ M\dot{V}b\ | \ m\dot{g}v\dot{a}b\ Ki\ddot{t}Z\ cvi\ \dot{t}e|$
- $tj\ L\dot{v}P\hat{t}\ Kx\ Z\dot{v}\ e\ddot{v}L\ddot{v}\ Ki\ddot{t}Z\ cvi\ \dot{t}e|$
- $tj\ L\dot{v}P\hat{t}\dot{i}\ A\dot{\eta}\ | \ m\dot{y}e\dot{a}vR\dot{b}K\ GKK\ \dot{w}b\dot{t}q\ \dot{w}e\dot{v}\dot{y}c\dot{v}Z\dot{b}\ Ki\ddot{t}Z\ cvi\ \dot{t}e|$
- $tj\ L\dot{v}P\hat{t}\dot{i}\ m\dot{v}n\dot{v}t\dot{h}\dot{v}\ mgxKi\ddot{Y}i\ m\dot{g}v\dot{a}b\ Ki\ddot{t}Z\ cvi\ \dot{t}e|$

7.1 $\text{Ce}^{+3} \text{V}^{+5} \text{Cr}^{+6} \text{Pb}^{+4}$

(1) $\text{thv} \vdash \text{Mi} \mid \text{Yi} \text{ wewbgq wewa} :$

$a, b \in \mathbb{N}$ thì $a + b = b + a$ và $ab = ba$

(2) $\mathbb{Z}[i]$ e $\mathbb{E}b$ wera :

a, b, c Gi th#Kv#bv gvt#bi Rb", $a(b + c) = ab + ac$, $(b + c)a = ba + ca$

Avgi v mgxKi YwU j ¶ Kw i : $x + 3 = 7$.

(K) mgxKi YwUi AÁvZ i wvk ev Pj K †KvbWU?

() mgxKi YwUi cñµqv WPy †KvbWU?

(M) $mgxKi Y_{wU} mi j \quad mgxKi Y_{wK} bv?$

(N) mgxKi YwUi gj KZ?

Augiv Rmb Pj K, cōuqv iPy l mgvb iPy msewj Z MwYwZK evK†K mǵxKiY etj | Avi Pj †Ki GK NvZ
wewkó mǵxKiY†K mij mǵxKiY etj | mij mǵxKiY GK ev GKwaK Pj Kwekó n†Z cv†i |

$$\text{thgb, } x+3=7, \quad 2y-1=y+3, \quad 3z-5=0, \quad 4x+3=x-1,$$

$$x + 4y - 1 = 0, \quad 2x - y + 1 = x + y$$

Avgiv G Aa'vtq i'ayGK Pj Kwekó mij mgxKiY wbtq Avtj vPbv Kie|
 mgxKiY mgvavb Kti Pj tKi th gvb cvl qv hvq, GtK mgxKiYwUi gj etj | gj wU Øviv mgxKiYwU wmx nq|
 A_ŕ, Pj KwUi H gvb mgxKiY emvtj mgxKiYwUi `ßc¶| mgvb nq|

mgxKiY mgvavtbi Rb" PriwU "Ztm× AvtQ, Zv Avgiv Rwb| G,tjv ntjv :

- (1) ci`úi mgvb iwki cØZ"KwUi mv+_ GKB iwki thvM Ki tj thvMdj ,tjv ci`úi mgvb nq|
- (2) ci`úi mgvb iwki cØZ"KwU t_+K GKB iwki wetqvM Ki tj wetqvMdj ,tjv ci`úi mgvb nq|
- (3) ci`úi mgvb iwki cØZ"KwU+K GKB iwki Øviv ,Y Ki tj ,Ydj ,tjv ci`úi mgvb nq|
- (4) ci`úi mgvb iwki cØZ"KwU+K Akb" GKB iwki Øviv fvM Ki tj fvMdj ,tjv ci`úi mgvb nq|

KiR :

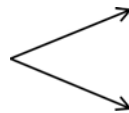
$$2x - 1 = 0 \text{ mgxKiYwUi NvZ KZ ? Gi cØµqv wPy tKivwU wj L | mgxKiYwUi gj KZ?}$$

7.2 mgxKiYi weiamgn

(1) c¶|vš+ weia :

mgxKiY-1

$$x - 5 = 3$$

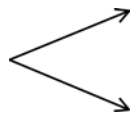


$$\begin{array}{l} \text{cieZPavc} \\ \text{(K) } x - 5 + 5 = 3 + 5 \quad [^{\text{Ztm}} \times (1)] \end{array}$$

$$\text{(L) } x = 3 + 5$$

mgxKiY-2

$$4x = 3x + 7$$



$$\begin{array}{l} \text{cieZPavc} \\ \text{(K) } 4x - 3x = 3x + 7 - 3x \quad [^{\text{Ztm}} \times (2)] \end{array}$$

$$\text{(L) } 4x - 3x = 7$$

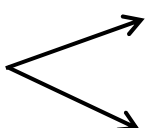
mgxKiY-1 G (L) Gi t¶|tĦ 5 Gi wPy cwi ewZŽ ntq evgc¶| t_+K Wwbc+¶| tMtQ | mgxKiY-2 G (L) Gi t¶|tĦ 3x Gi wPy cwi ewZŽ ntq Wwbc¶| t_+K evgc+¶| tMtQ |

tKv+bv mgxKiYi th+tKv+bv c`+K GK c¶| t_+K wPy cwi eZØ Kti Acic+¶| mi vmi "vbs+ Kiv hvq |
 GB "vbs++K etj c¶|vš+ weia |

(2) eR⁰ weia :

(a) thv[†]Mi eR⁰ weia :

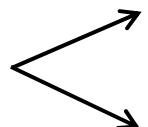
mgxKiY-1 $2x + 3 = a + 3$ cieZPavc



(K) $2x + 3 - 3 = a + 3 - 3$ [⁻Ztm× (2)]

(L) $2x = a$

mgxKiY-2 $7x - 5 = 2a - 5$ cieZPavc



(K) $7x - 5 + 5 = 2a - 5 + 5$ [⁻Ztm× (1)]

(L) $7x = 2a$

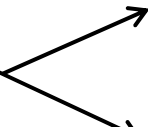
mgxKiY-1 G (L) Gi t[†] t[†] Dfqc[†] t[†]K 3 eR⁰ Kiv n[†]q[†]Q|

mgxKiY-2 G (L) Gi t[†] t[†] Dfqc[†] t[†]K -5 eR⁰ Kiv n[†]q[†]Q|

tKv[†]bv mgxKi[†]Yi Dfqc[†] t[†]K GKB w[†]Pyh[†] m[†]k c[†] mi[†]vm[†] eR⁰ Kiv hvq| G[†]K ej[†] v n[†]q thv[†]Mi (ev we[†]q[†] t[†]Mi) eR⁰ weia |

(b) [†]Yi eR⁰ weia :

mgxKiY $4(2x + 1) = 4(x - 2)$ cieZPavc



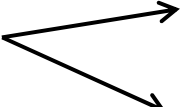
(K) $\frac{4(2x + 1)}{4} = \frac{4(x - 2)}{4}$ [⁻Z:wm× (4)]

(L) $2x + 1 = x - 2$

mgxKiYw[†]ji (L) Gi t[†] t[†] Dfqc[†] t[†]K mv[†]aviY Drcv[†] K mi[†]vm[†] eR⁰ Kiv hvq| G[†]K ej[†] v n[†]q [†]Yi eR⁰ weia |

(3) Avo[†] Yb weia :

mgxKiY $\frac{x}{2} = \frac{5}{3}$ cieZPavc



(K) $\frac{x}{2} \times 6 = \frac{5}{3} \times 6$ [Dfqc[†] t[†]K ni 2 | 3 Gi j .mv. [†]. 6 Øiv [†]Y Kiv n[†]q[†]Q]

(L) $3 \times x = 2 \times 5$

mgxKiYw[†]ji (L) Gi t[†] t[†] wj L[†]Z cwi ,

evgtñi je × Wbctñi ni = evgtñi ni × Wbctñi je

GtK ej v nq Avo, Yb weia |

(4) cñZmvg weia :

$$\text{mgxKiY : } 2x + 1 = 5x - 8$$

$$\text{ev, } 5x - 8 = 2x + 1$$

GKB mñ_ evgtñi me, tj v c` Wbctñi | Wbctñi me, tj v c` evgtñi tKtbn wPy cwieZñ bn Kti
vbršt Kiv hvq | GtK ej v nq cñZmvg weia |

Dwj øwLZ `Ztm×mgn I weiamgn cñqvM Kti GKwU mgxKiYtK Aci GKwU mnR mgxKiY i/cvšt Kti
metktl Zi $x = a$ AvKti cvl qv hvq | A_ñ, Pj K x Gi gvb a wYñ Kiv nq |

D`vni Y 1 | mgvavb Ki : $x + 3 = 9$.

$$\text{mgvavb : } x + 3 = 9$$

$$\text{ev, } x = 9 - 3 \quad [\text{cñvšt Kti}]$$

$$\text{ev, } x = 6$$

$$\therefore \text{mgvavb : } x = 6$$

$$\text{weKí wbgg : } x + 3 = 9$$

$$\text{ev, } x + 3 - 3 = 9 - 3 \quad [\text{Dfqcñ tñK 3}]$$

$$\text{ev, } x = 6 \quad \text{wetqvM Kti}]$$

$$\therefore \text{mgvavb : } x = 6$$

D`vni Y 2 | mgvavb Ki I iñ× cixñv Ki : $4y - 5 = 2y - 1$.

$$\text{mgvavb : } 4y - 5 = 2y - 1.$$

$$\text{ev, } 4y - 2y = -1 + 5 \quad [\text{cñvšt Kti}]$$

$$\text{ev, } 2y = 4$$

$$\text{ev, } 2y = 2 \times 2$$

$$\text{ev, } y = 2 \quad [\text{Dfqcñ tñK maviY Drcv`K 2 eRñ Kti}]$$

$$\therefore \text{mgvavb : } y = 2$$

iñ× cixñv : cñE mgxKiY y Gi gvb 2 ewmtq cvB,

$$\text{evgcñ} = 4y - 5 = 4 \times 2 - 5 = 8 - 5 = 3$$

$$\text{Wbctñ} = 2y - 1 = 2 \times 2 - 1 = 4 - 1 = 3.$$

$$\therefore \text{evgcñ} = \text{Wbctñ}$$

$$\therefore \text{mgxKiYwU mgvavb iñ nñqtQ |}$$

$$D^{\text{vni}} Y 3 | \text{mgvavb Ki} : \frac{2z}{3} - \frac{z}{6} = -\frac{3}{4}$$

$$\text{mgvavb} : \frac{2z}{3} - \frac{z}{6} = -\frac{3}{4}$$

$$\text{ev, } \frac{4z - z}{6} = -\frac{3}{4} \quad [\text{evgc}\ddot{\text{q}} \text{ ni } 3, 6 \text{ Gi j .mv.}_{\text{.}} 6]$$

$$\text{ev, } \frac{3z}{6} = -\frac{3}{4}$$

$$\text{ev, } \frac{z}{2} = -\frac{3}{4}$$

$$\text{ev, } 4 \times z = 2 \times (-3) \quad [\text{Avo}_{\text{.}} \text{Yb K}\ddot{\text{i}}]$$

$$\text{ev, } 2 \times 2z = 2 \times (-3)$$

$$\text{ev, } 2z = -3 \quad [\text{Dfqc}\ddot{\text{q}} \text{ t}_{\text{.}}\text{K mvavi Y Drcv` K } 2 \text{ eR}^{\text{b}} \text{ K}\ddot{\text{i}}]$$

$$\text{ev, } \frac{2z}{2} = -\frac{3}{2} \quad [\text{Dfqc}\ddot{\text{q}} \text{ t}_{\text{.}}\text{K } 2 \text{ Øviv fvM K}\ddot{\text{i}}]$$

$$\text{ev, } z = -\frac{3}{2}$$

$$\therefore \text{mgvavb} : z = -\frac{3}{2}.$$

$$D^{\text{vni}} Y 4 | \text{mgvavb Ki} : 2(5 + x) = 16.$$

$$\text{mgvavb} : 2(5 + x) = 16$$

$$\text{ev, } 2 \times 5 + 2 \times x = 16 \quad [\text{e}\ddot{\text{E}}\text{b wewa Abjnv}\ddot{\text{i}}]$$

$$\text{ev, } 10 + 2x = 16$$

$$\text{ev, } 2x + 10 - 10 = 16 - 10 \quad [\text{Dfqc}\ddot{\text{q}} \text{ t}_{\text{.}}\text{K } 10 \text{ w}\ddot{\text{e}}\text{tqvM K}\ddot{\text{i}}]$$

$$\text{ev, } 2x = 6$$

$$\text{ev, } \frac{2x}{2} = \frac{6}{2} \quad [\text{Dfqc}\ddot{\text{q}} \text{ t}_{\text{.}}\text{K } 2 \text{ Øviv fvM K}\ddot{\text{i}}]$$

$$\text{ev, } x = 3.$$

$$\therefore \text{mgvavb } x = 3$$

$$D^{\text{vni}} Y 5 | \text{ mgvavb Ki : } \frac{3x+7}{4} + \frac{5x-4}{7} = x + 3\frac{1}{2}$$

$$\text{mgvavb : } \frac{3x+7}{4} + \frac{5x-4}{7} = x + 3\frac{1}{2}$$

$$\text{ev, } \frac{3x+7}{4} + \frac{5x-4}{7} - x = \frac{7}{2} \quad [\text{c}\text{v}\text{š}\text{i} \text{ K}\text{i}]$$

$$\text{ev, } \frac{7(3x+7) + 4(5x-4) - 28x}{28} = \frac{7}{2} \quad [\text{evgct}\text{v}\text{v} \text{ ni } 4, 7 \text{ Gi j .mv. } 28]$$

$$\text{ev, } \frac{21x+49+20x-16-28x}{28} = \frac{7}{2} \quad [\text{e}\text{E}b \text{ wewa Abjv}\text{v}\text{i}]$$

$$\text{ev, } \frac{13x+33}{28} = \frac{7}{2}$$

$$\text{ev, } 28 \times \frac{13x+33}{28} = 28 \times \frac{7}{2} \quad [\text{Dfqc}\text{v}\text{v}\text{K } 28 \text{ Øiv } Y \text{ K}\text{i}]$$

$$\text{ev, } 13x+33=98$$

$$\text{ev, } 13x=98-33$$

$$\text{ev, } 13x=65$$

$$\text{ev, } \frac{13x}{13} = \frac{65}{13} \quad [\text{Dfqc}\text{v}\text{v}\text{K } 13 \text{ Øiv f}\text{v}\text{M K}\text{i}]$$

$$\text{ev, } x=5$$

$$\therefore \text{ mgvavb : } x=5$$

KvR : mgvavb Ki :

$$1 | 2x-1=0 \quad 2 | \frac{x}{2}+1=3 \quad 3 | 4(y-3)=8$$

Abkxj bx 7.1

mgvavb Ki :

$$1 | 4x+1=2x+7$$

$$2 | 5x-3=2x+3$$

$$3 | 3y+1=7y-1$$

$$4 | 7y-5=y-1$$

$$5 | 17-2z=3z+2$$

$$6 | 13z-5=3-2z$$

$$7 | \frac{x}{4} = \frac{1}{3}$$

$$8 | \frac{x}{2} + 1 = 3$$

$$9| \quad \frac{x}{3} + 5 = \frac{x}{2} + 7$$

$$10| \quad \frac{y}{2} - \frac{y}{3} = \frac{y}{5} - \frac{1}{6}$$

$$11| \quad \frac{y}{5} - \frac{2}{7} = \frac{5y}{7} - \frac{4}{5}$$

$$12| \quad \frac{2z-1}{3} = 5$$

$$13| \quad \frac{5x}{7} + \frac{4}{5} = \frac{x}{5} + \frac{2}{7}$$

$$14| \quad \frac{y-2}{4} + \frac{2y-1}{3} = y - \frac{1}{3}$$

$$15| \quad \frac{3y+1}{5} = \frac{3y-7}{3}$$

$$16| \quad \frac{x+1}{2} - \frac{x-2}{3} - \frac{x-3}{5} = 2$$

$$17| \quad 2(x+3) = 10$$

$$18| \quad 5(x-2) = 3(x-4)$$

$$19| \quad 7(3-2y) + 5(y-1) = 34$$

$$20| \quad (z-1)(z+2) = (z+4)(z-2)$$

7.3 mij mgxKiY MVb I mgvavb

GKRb tμZv 3 tKwR cvUwj „o wKbZ Pvb| t`vKvb`vi x tKwR IRtbi GKwU eo cvUwj i AṭaR gvcṭj b| wKŠ' GtZ 3 tKwRi Kg ntj v| Avtṭiv 1 tKwR t`l qvq 3 tKwR ntj v| Avgiv GLb tei KiṭZ Pvb, mṣúY©cvUwj wU i IRb KZ wQj, A_ṙ x Gi gvb KZ ? G Rb" mgm" wU t_ṭK GKwU mgxKiY MVb

KiṭZ nte| Gtṙṭṭṭ mgxKiY wU nte $\frac{x}{2} + 1 = 3$ | mgxKiY wU mgvavb Kiṭj x Gi gvb cvl qv hvte| A_ṙ, „ṭoi mṣúY©cvUwj i IRb Rvbv hvte|

KvR : c0 Ě Z_ " t_ṭK mgxKiY MVb Ki (GKwU Kṭi t`l qv ntj v) :	
c0 Ě Z_ "	mgxKiY
1 GKwU msL`v x Gi cṙP_ Y t_ṭK 25 wṭqṭM Kiṭj wṭqṭMdj nte 190	
2 cṭṭi eZḡvb eqm y eQi, wczvi eqm cṭṭi eqṭmi Pri _Y Ges Zṭ` i eZḡvb eqṭmi mgwó 45 eQi	$y + 4y = 45$
3 GKwU AvqZvKvi cṭṭi i `N© x wḡUvi, `N© Aṭcṙṭv c0' 3 wḡUvi Kg Ges cṭṭi wU cwi mxgv 26 wḡUvi	

D`vniY 7| Anbv GKwU cixṙṭvq Bṭi wRtZ I MwṭZ tḡvU 176 bṣṭ tṭṭṭQ Ges Bṭi wR Aṭcṙṭ MwṭZ 10 bṣṭ tenk tṭṭṭQ| tm tKvb wṭṭṭ KZ bṣṭ tṭṭṭQ?

mgvavb : awi, Anbv Bṭi wRtZ x bṣṭ tṭṭṭQ|

mṙZivs, tm MwṭZ tṭṭṭQ x + 10 bṣṭ |

ckqtZ,

$$x + x + 10 = 176$$

$$\text{ev, } 2x + 10 = 176$$

$$\text{ev, } 2x = 176 - 10 \quad [\text{c}\ddot{\text{v}}\text{š}\text{t} \text{ K}\text{t}\text{i}]$$

$$\text{ev, } 2x = 166$$

$$\text{ev, } \frac{2x}{2} = \frac{166}{2} \quad [\text{Dfqc}\ddot{\text{v}}\text{t} \text{ K} \text{ 2 } \text{Øvi v f}\ddot{\text{v}}\text{M K}\text{t}\text{i}]$$

$$\text{ev, } x = 83$$

$$\therefore x + 10 = 83 + 10 = 93$$

\therefore Anbv BstiwRtZ tctqtQ 83 baf Ges MwYtZ tctqtQ 93 baf |

D`vniY 8 | k`vgj t`vKvb t`tk wKQzKj g wKbj | tm,tj vi $\frac{1}{2}$ Ask Zvi tevbtK | $\frac{1}{3}$ Ask Zvi fvBtK w`j | Zvi KvftQ Avi 5w Kj g iBj | k`vgj KqW Kj g wKtbwQj ?

mgvavb : awi , k`vgj xw Kj g wKtbwQj |

\therefore k`vgj Zvi tevbtK t`q x Gi $\frac{1}{2}$ w ev $\frac{x}{2}$ w Kj g Ges Zvi fvBtK t`q x Gi $\frac{1}{3}$ w ev $\frac{x}{3}$ w Kj g |

$$\text{kZØymvti, } x - \left(\frac{x}{2} + \frac{x}{3} \right) = 5$$

$$\text{ev, } x - \frac{x}{2} - \frac{x}{3} = 5$$

$$\text{ev, } \frac{6x - 3x - 2x}{6} = 5 \quad [\text{evgct}\ddot{\text{v}}\text{t} \text{ ni } 2, 3 \text{ Gi j .mv.}_{\text{.}} 6]$$

$$\text{ev, } \frac{x}{6} = 5$$

$$\text{ev, } x = 5 \times 6 \quad [\text{Avo}_{\text{.}} \text{Yb K}\text{t}\text{i}]$$

$$\text{ev, } x = 30$$

\therefore k`vgj 30w Kj g wKtbwQj |

D`vniY 9 | GKwU evm NÈvq 25 wk.wg. MwZtefM XvKvi MveZj x t_#K Awii Pv tcfQvj | Avevi evmU NÈvq 30 wk.wg. MwZtefM Awii Pv t_#K MveZj x wdti Gj | hvZvqv#Z evmU tgvU $5\frac{1}{2}$ NÈv mgq j vMj | MveZj x t_#K Awii Pvi `#Zi KZ?

mgvavb : g#b Kwi , MveZj x t_#K Awii Pvi `#Zi d wk.wg. |

\therefore MveZj x t_#K Awii Pv th#Z mgq j v#M $\frac{d}{25}$ NÈv |

Avevi Awii Pv t_#K MveZj x wdti Avmt#Z mgq j v#M $\frac{d}{30}$ NÈv |

\therefore hvZvqv#Z evmU tgvU mgq j vMj $\left(\frac{d}{25} + \frac{d}{30}\right)$ NÈv |

ckg#Z, $\frac{d}{25} + \frac{d}{30} = 5\frac{1}{2}$

ev, $\frac{6d + 5d}{150} = \frac{11}{2}$

ev, $11d = \cancel{150}^{75} \times \frac{11}{\cancel{2}_1}$

ev, $d = 75$

\therefore MveZj x t_#K Awii Pvi `#Zi 75 wk.wg. |

Abkxj bx 7.2

wb#Pi mgm`v ,#tj v t_#K mgxKiY MVb K#i mgvavb Ki :

1 | tKvb msL`vi w#tYi mv#_ 5 thvM Ki#j thvMdj 25 n#e?

2 | tKvb msL`v t_#K 27 wetqvM Ki#j wetqvMdj - 21 n#e?

3 | tKvb msL`vi GK-ZZxqysk 4 Gi mgvb n#e?

4 | tKvb msL`v t_#K 5 wetqvM Ki#j wetqvMdj i 5 ,Y mgvb 20 n#e?

5 | tKvb msL`vi A#R t_#K Zvi GK-ZZxqysk wetqvM Ki#j wetqvMdj 6 n#e?

6 | wZbwU #wgK `vfweK msL`vi mgwó 63 ntj , msL`v wZbwU tei Ki |

7 | `BwU msL`vi thvMdj 55 Ges eo msL`wU i 5 ,Y tQvU msL`wU i 6 ,#tYi mgvb | msL`v `BwU wbYQ Ki |

- 8| MxZv, wi Zv I wgzvi GKt 180 UvKv AvtQ| wi Zvi tPtq MxZvi 6 UvKv Kg I wgzvi 12 UvKv teik AvtQ| Kvi KZ UvKv AvtQ?
- 9| GKw LvZv I GKw Kj tgi tgvU `vg 75 UvKv| LvZvi `vg 5 UvKv Kg I Kj tgi `vg 2 UvKv teik ntj , LvZvi `vg Kj tgi `vtgi wY ntZv| LvZv I Kj tgi tKvbi `vg KZ?
- 10| GKRb dj wtpZvi tgvU dtj i $\frac{1}{2}$ Ask Avtcj , $\frac{1}{3}$ Ask Kgj vtj eyI 40 w Avg AvtQ| Zvi wku tgvU KZ , tj v dj AvtQ?
- 11| wZvi eZgvb eqm ct i eZgvb eqtmi 6 ,Y| 5 eQi ci Zvt i eqtmi mgw nte 45 eQi | wZv I ct i eZgvb eqm KZ?
- 12| wj Rv I wLvi eqtmi AbcvZ 2:3| Zvt i `BRtbi eqtmi mgw 30 eQi ntj , Kvi eqm KZ ?
- 13| GKw wptKU tLj vq Bgb I mgtbi tgvU ivbmsL 58 | Bgtbi ivbmsL mgtbi ivbmsL vi wYi tPtq 5 ivb Kg| H tLj vq Bgtbi ivbmsL KZ?
- 14| GKw tUb NEvq 30 wK.wg. teM Ptj Kgj vcj t÷kb t_tK bvi vqYMA t÷k b tcQvj | tUbi teM NEvq 25 wK.wg. ntj 10 wguU mgq teik j vMZ | `B t÷k b gta `t Zj KZ?
- 15| GKw AvqZvKvi Rigi `Nc i wZb ,Y Ges Rigi cwi mxgv 40 wguvi | Rigi `Nc I c wY Ki |

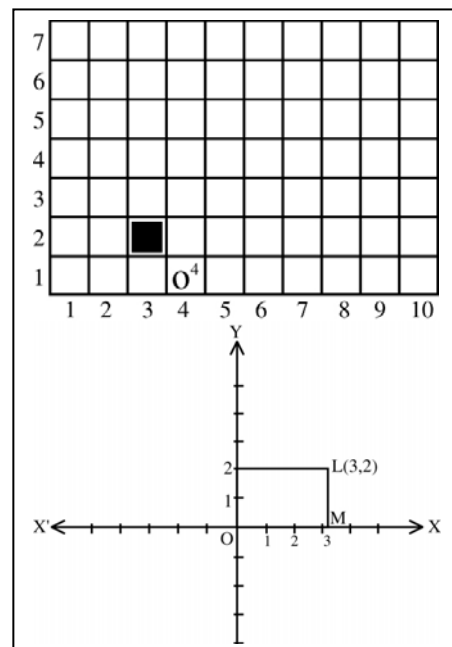
tj LwP

7.4 `vbt4i aviYv

dtYi wL vZ MZwe` ti tb t` KvZ©(Rene Descartes : 1596–1650) : meeg `vbt4i aviYv t`b| wZb `Bw ci `ui t`x j t`Lvi mvtct w`j Ae`vb e`vL`v Kt b|

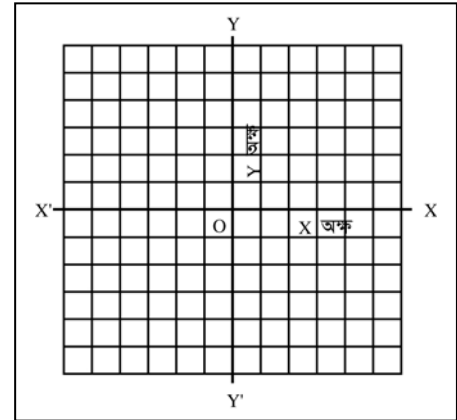
GKw tkYKt GKK Avmbwvbm GKRB wkv_8 Ae`vb tKv_vq RvtZ ntj AbfvgK tiLv ev kqv tiLv eivei tKv_vq AvtQ Ges Dj t`tiLv ev Lvov tiLv eivei tKv_vq AvtQ Zv Rvov `i Kvi |

awi , tkYKt GKRB wkv_8 wj Rv (L)-Gi Ae`vb RvtZ PvB| wj Rvi Ae`vbK GKw w`y(.) wntmte wetePbv Kiv hvq| wPt j wKvi , wj Rv GKw wv`8 w`y O t_tK AbfvgK tiLv OX eivei 3 GKK `fi M w`jZ Ges tmLvb t_tK Dj t`tiLv OY Gi mgvstvj tiLv eivei Dciw`tK 2 GKK `fi L w`jZ Ae`vb KtQ| Zvi G Ae`vbK (3, 2) Oviv cKvk Kiv nq|



7.5 we`ycvZb

QK KvM†R mgvb `†i ci`úi†Q`x mgvŠ†vj mij†iLv Øviv tQvU tQvU e†M`uef³ Kiv `v†K| QK KvM†R †Kv†bv we`j Ae`vb †`Lv†bv†K ev †Kv†bv we`y `vcb Kiv†K we`y cvZb etj | we`y cvZ†bi Rb` mjeavg†Zv `†i ci`úi j †^mij†iLv tbiqv nq| wP†† XOX' I YOY' tiLvØq ci`úi j †f†e O we`†Z tQ` K†i†Q| O we`†K ejv nq gj we`y| Ab†vgK tiLv XOX' †K x -A†† Ges Dj Ø††iLv YOY' †K y -A†† ejv nq|

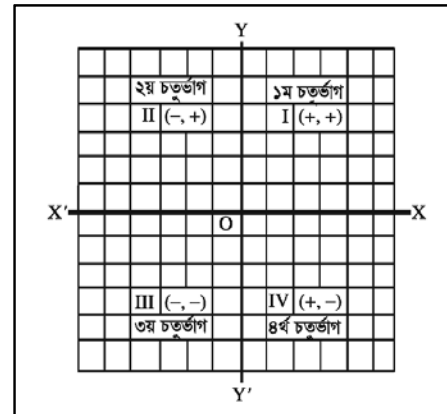


cåvbZ QK KvM†Ri ¶i Zg eM¶††i evûi `N¶K GKK w†m†e aiv nq| m†aviY†e th†Kv†bv we`j `v†v†K (x, y) tj Lv nq| x -†K ejv nq we`†i x -`v†v†K ev fR Ges y -†K ejv nq we`†i y -`v†v†K ev †KwU| `úóZB gj we`y O Gi `v†v†K n†e $(0, 0)$ |

gj we`y††K x -A††i Wb†K abvZK w`K I evgw`K FYvZK w`K| Avevi, gj we`y††K y -A††i

Dctii w`K abvZK w`K I w†Pi w`K FYvZK w`K| dtj QKwU A††Øq Øviv P†wU f†M uef³ n†q†Q| GB†wM P†wU N†oi Ku†vi NY†bi wecixZ w`K Ab†vqx 1g, 2q, 3q I 4-©PZ††M w†m†e cwiwPZ| cØg PZ††M th†Kv†bv we`j x

`v†v†K I y `v†v†K D†qB abvZK, wØZxq PZ††M th†Kv†bv we`j x `v†v†K FYvZK I y `v†v†K abvZK, ZZxq PZ††M th†Kv†bv we`j x `v†v†K FYvZK I y `v†v†K FYvZK Ges PZ††M th†Kv†bv we`j x `v†v†K abvZK I y `v†v†K FYvZK|

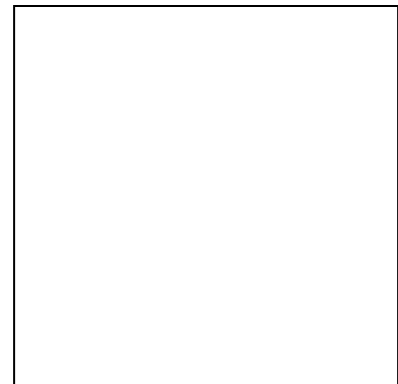


c†eP Ab†Q† Av†j wPZ wj Rvi Ae`vb $(3, 2)$ w†Y¶ Kivi Rb` cØ†g x -A†† eiwei Wb††K 3 GKK `††Z† th†Z n†e| Z†i ci†mLv†††K Lvov Dci w`K 2 GKK `††Z† th†Z n†e| Z† n†j wj Rvi Ae`vb L we`j `v†v†K n†e $(3, 2)$ | Ab†e†v†e wP†† P we`j `v†v†K $(-2, 4)$ |

D`vniY 1| QK KvM†R w†Pi cØg P†wU we`y`vcb K†i Zxi wP†y Ab†vqx th†w Ki : $(3, 2) \rightarrow (6, 2) \rightarrow (6, 4) \rightarrow (3, 4)$ | wP††wU R`w†wZK AvKwZ Kx n†e?

mgvavb : awi, we`yP†i wU h`v†††g A, B, C, D | A`††.

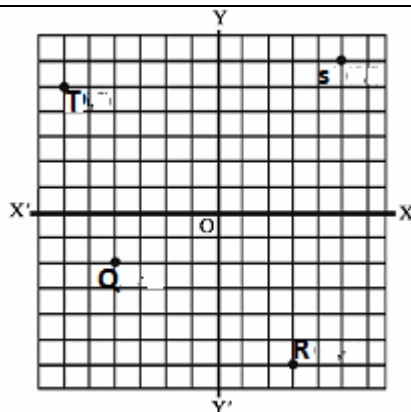
$A(3, 2), B(6, 2), C(6, 4)$ Ges $D(3, 4)$ | QK KvM†R D†q A††



ႳႬၵ Ⴚg eMᄫᅣᆯᆮᆪᆢ ႸႬZ evüi Ⴜ Nᄫᅣ GKK awi | A weᄫᅣ Ⴛ Ⴞvcb KiᆺZ gj weᄫᅣ y O ᆲ_ᆺK x -Aᆲᆮᆪᆢ
 Wbwᆮ K eivei 3wU ᆲQvU eᆲMP evüi mgvb ᆲᆺi wMtq Dcᆺi i wᆲK 2wU ᆲQvU eᆲMP evüi mgvb DᆲV ᆲMᆺj th
 weᄫᅣ Ⴛ cvl qv hrᆺe, Zv A weᄫᅣ Ⴛ Abjᆺcfᆺrᆺe cÖ Ē Aenkö weᄫᅣ jngᆮ Ⴞvcb Kwii | Zvi ci
 $A \rightarrow B \rightarrow C \rightarrow D \rightarrow A$ Gfᆺrᆺe weᄫᅣ Ⴛ tᆺj v thvM Kwii | GᆺZ ABCD wPᆲwU cvl qv ᆲMᆺj | ᆲ Lᆺ hvq
 th, ABCD wPᆲwU GKwU AvqZ |

KvR :

$\widehat{P} \vdash_{\mathcal{K}} Q, R, S, T$ we have $\vdash_{\mathcal{K}} Q, R, S, T$.



7.6 tj LwP†Î mgxKi†Yi mgvavb

tj LwPŋi mŋvŋh mŋtRB mgxKiŋYi mgvavb tei Kiv hvq| gŋb Kwŋ, $2x-5=0$ mgxKiYŋU mgvavb KiŋZ nte| mgxKiŋYi evgcŋ $2x-5$ iŋkŋZ x -Gi wewfbægŋb emŋj iŋkŋU i wewfbægŋb cvl qv hvq| tj LwPŋ cŋZŋU x tK fR Ges iŋkŋU i gŋbŋK tKŋU aŋi GKŋU Kŋi weŋ`ycvl hv hŋte| weŋ`y,tj v thŋM Kŋi GKŋU mijŋtiLv AwZ nte| mijŋtiLŋU th weŋ`jZ AŋŋtK tQ` Kŋi, tŋB weŋ`j fRB ŋbŋYŋ mgvavb| tKbbv, x -Gi GB gŋŋbi Rb iŋkŋU i gŋb 0 nq, hv mgxKiŋYi Wwbcŋŋi gŋŋbi mgŋb nq| G tŋŋŋ mgxKiYŋU i mgvavb $x=\frac{5}{2}$ |

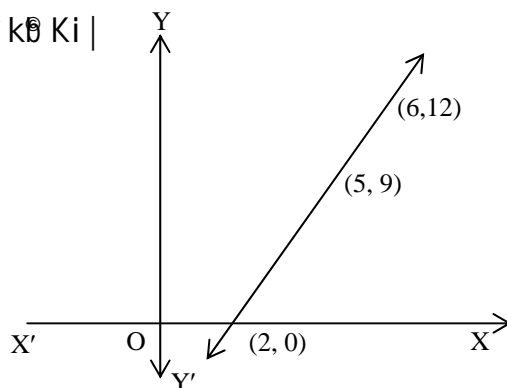
D`vniY 2 | $3x - 6 = 0$ mgyavb Ki Ges tj LwP+Î mgyavb c0 k0 Ki |
mgyavb : $3x - 6 = 0$

ev, $3x = 6$ [cʷvšt̚ kt̚i]

$$\text{ev}, \frac{3x}{3} = \frac{6}{3} \text{ [Dfqc]} \text{†K 3 Øiv fWM K†i}$$

$$\text{ev, } x = 2$$

$$\therefore \text{mgvavb} : x = 2$$



tj LwPî A½b : cð Ê mgxKiY $3x - 6 = 0$

x Gi KtqKwU gvb wbtq $3x - 6$ Gi Abjfc

gvb tei Kwi Ges wbtPi QKwU `Zwi Kwi :

x	$3x - 6$	$(x, 3x - 6)$
2	0	(2,0)
5	9	(5,9)
6	12	(6,12)

tj LwPî A½bi Rb` wZbwU we`y (2, 0), (5, 9) l (6, 12) tbi qv ntj v|

gtb Kwi, ci `úi j $\alpha^X OX'$ l YOY' h_vµtg $x-A$ l $y-A$ Ges 0 gj we`y|

QK KwMþR Dfq At¶¶ ¶i Zg eM¶¶tî i GK evûi ``N¶K GKK ati (2, 0), (5, 9), (6, 12) we`y, tj v
`vcb Kwi | Zvici we`y, tj v cici msthvM Kwi | tj LwPî GKwU mij ti Lv cvB | mij ti LwU $x-A$ ¶tK
(2, 0) we`y Z tQ` Kti | we`yUi fR ntj v 2 | mZivs cð Ê mgxKiYi mgvavb $x = 2$ |

D`vniY 3 | tj LwPî i mrvth` mgvavb Ki : $3x - 4 = -x + 4$

mgvavb : cð Ê mgxKiY $3x - 4 = -x + 4$

x Gi KtqKwU gvb wbtq $3x - 4$ Gi Abjfc gvb tei Kwi Ges
cvtki QK-1 `Zwi Kwi :

$\therefore 3x - 4$ Gi tj tLi Dci wZbwU we`y (0, -4), (2, 2),
(4, 8) wB |

Avevi, x Gi KtqKwU gvb wbtq $-x + 4$ Gi Abjfc gvb tei Kwi Ges cvtki QK-2 `Zwi Kwi :

$\therefore -x + 4$ Gi tj tLi Dci wZbwU we`y (0, 4), (2, 2), (4, 0)

wB |

gtb Kwi, ci `úi j $\alpha^X OX'$ l YOY' h_vµtg $x-A$ l $y-$

A Ges 0 gj we`y | GLb, QK-1 G cðß (0, -4), (2, 2),

(4, 8) we`y wZbwU `vcb Kwi Ges Gt` i cici msthvM Kwi |

tj LwPî GKwU mij ti Lv cvB | Avevi, QK-2G cðß (0, 4), (2, 2),

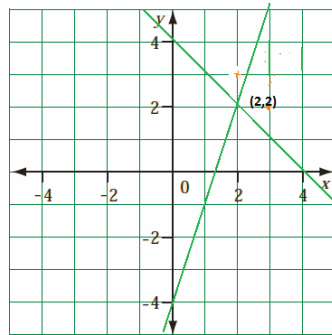
(4, 0) we`y wZbwU `vcb Kwi l Gt` i cici msthvM Kwi | Gt¶tî l tj LwPî GKwU mij ti Lv cvB |

QK-1

x	$3x - 4$	$(x, 3x - 4)$
0	-4	(0, -4)
2	2	(2, 2)
4	8	(4, 8)

QK-2

x	$-x + 4$	$(x, -x + 4)$
0	4	(0, 4)
2	2	(2, 2)
4	0	(4, 0)



j ¶ Kwi, mij tiLv `ßw ci`úi (2, 2) we`fZ tQ` Kti tQ| tQ`we`fZ $3x - 4$ l $-x + 4$ Gi gvb ci`úi mgvb| mZi vs, cÖ Ë mgxKi tYi mgvab ntj v (2, 2) we`fZ fRi gvb, A_¶ $x = 2$ |

KvR : wb tPi mgxKi tYi tjvi mgvab tbi tj Lw PÎ AwK :

1| $2x - 1 = 0$ 2| $3x + 5 = 2$

Abkxj bx 7.3

1| $\frac{x}{2} = \frac{1}{3}$ mgxKi tYi gj wb tPi tKvbwU?

- K. $\frac{1}{2}$ L. $\frac{2}{3}$ M. $\frac{3}{2}$ N. 6

2| $\frac{x}{3} - 3 = 0$ mgxKi tYi gj wb tPi tKvbwU?

- K. $\frac{1}{3}$ L. 3 M. 9 N. -9

3| GKwU wÎ fRi evü wZbwUi ^N° $(x + 1)$ tm.wg., $(x + 2)$ tm.wg. l $(x + 3)$ tm.wg. $(x > 0)$ | wÎ fRwUi cwi mxgv 15 tm.wg. ntj, x Gi gvb KZ?

- K. 1 tm.wg. L. 2 tm.wg. M. 3 tm.wg. N. 6 tm.wg.

4| tKvb msL`vi GK-PZi_ßk 4 Gi mgvb nte?

- K. 16 L. 12 M. 4 N. $\frac{1}{4}$

5| wb tPi Z_`_tj v j ¶ Ki :

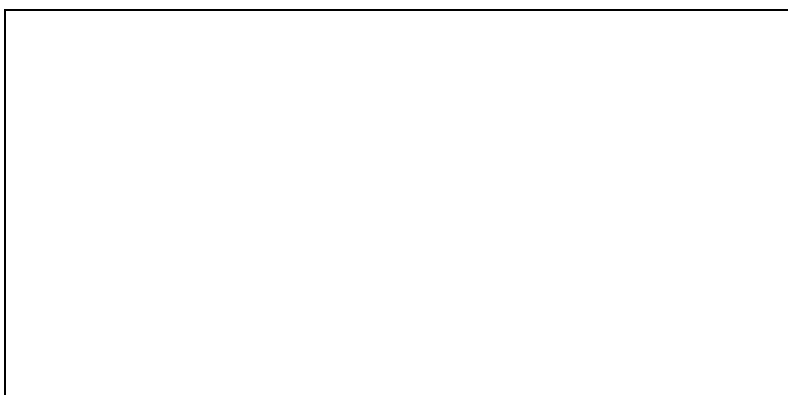
- i. mgxKi tYi Dfqc¶ t_ßK mvavi Y Drcv` K eR° Kiv hvq|
 ii. $2x + 1 = x - 3$ GKwU wØNvZ mgxKi Y|
 iii. $x + 2 = 2$ mgxKi tYi gj 0.

Dcti i Zt_`i wfvE tZ wb tPi tKvbwU mwVK?

- K. i l ii L. i l iii M. ii l iii N. i, ii l iii

- 6| Kbtki woku 8w i tkqi woku 12w PKtj U AvtQ| Zvntj wtpi cktj vi DEi `vl :
- (1) tkqi KbkK xw PKtj U w`tj Zv`i PKtj U msL`v mgvb nte| tm tttt wtpi tkvb mgxKiYw mwK?
- K. $8 + x = 12$ L. $8 = 12 - x$ M. $8 + x = 12 - x$ N. $8 - x = x - 12$
- (2) x Gi gvb KZ ntj Zv`i PKtj U msL`v mgvb nte?
- K. 2 L. 4 M. 6 N. 10
- (3) Kbk tkqtk Kqw PKtj U w`tj tkqi PKtj U Kbk PKtj tui Pri ,Y nte?
- K. 2 L. 4 M. 6 N. 10
- 7| wpt t_k wtpi Qku ciY Ki :
- (Dfq Attt tt Zg eMtttt i evui `Ntt GKK ati)

wet`y	`vbw/4
A	(4, 3)
B	(-2,)
C	(, -5)
D	(,)
O	(,)
P	(, 0)
Q	(0,)



- 8| wtpi wet`y tj v QK KwMttR `vcb Kti ZxiwPy Abjvqx thvM Ki | wptwui R`wguZK bvgKiY Ki :
- (K) $(2, 2) \rightarrow (6, 2), \rightarrow (6, 6) \rightarrow (2, 6) \rightarrow (2, 2),$
- (L) $(0, 0) \rightarrow (-6, -6), \rightarrow (8, 6) \rightarrow (0, 0)$
- 9| mgvavb Ki Ges mgvavb tj Lwptt t`Lvl :
- (K) $x - 4 = 0$ (L) $2x + 4 = 0$ (M) $x + 3 = 8$
- (N) $2x + 1 = x - 3$ (O) $3x + 4 = 5x$
- 10| GKw wttftri wZb evui `N^o $(x + 2)$ tm.wg. $(x + 4)$ tm.wg. | $(x + 6)$ tm.wg. $(x > 0)$ Ges wttftri cwi mxgv 18 tm.wg. |
- K. c0 E kZttvqx AvbcwZK wpt AuK |
- L. mgxKiY Mvb Kti mgvavb Ki |
- M. mgvavtbi tj Lwpt AuK |
- 11| Xvkv I Awii Pri ga`eZP` i Zi 77 wK.wg. | GKw evm N`Evq 30 wK.wg. tetM Xvkv t_k Awii Pri ct_ i l bv w`j | Aci GKw evm N`Evq 40 wK.wg. tetM Awii Pv t_k Xvkv ct_ GKB mgtq i l bv w`j | evm `Bw Xvkv t_k x wK.wg. `ti wgwj Z ntj v |
- K. evm `Bw Awii Pv t_k KZ `ti wgwj Z nte Zv x Gi gva`tg cKvk Ki |
- L. x Gi gvb wbyq Ki |
- M. Mse`vttb tctvttZ tkvb evtmi KZ mgq j vMte?

Aóg Aa`vq mgvŠt+vj mij ti Lv

``bwb Rxeþb Avgvþ`i Pvi cvþk hv wKQzþ`wL I e`envi Kwi Gi wKQz Pvi þKvbn, wKQz þMvj vKvi | Avgvþ`i Nievw, `vj vbþKvWv, `i Rv-Rvbnj v, LvU-Avj gwi, tUvej -þPqvi, eB-LvZv BZ`w` meB Pvi þKvbn | Gt`i avi ,tj v mij ti Lv wntmte wetePbv Ki tj t`Lv hvq th, Giv mg`teZPev mgvŠt+vj |

Aa`vq tkþl wKv`v`v –

- mgvŠt+vj mij ti Lv I tQ`K Øviv DrcbþKvþYi `ewkó` e`vL`v Ki þZ cvi te |
- `þw mij ti Lv mgvŠt+vj nl qvi kZ`eYþv Ki þZ cvi te |
- `þw mij ti Lv mgvŠt+vj nl qvi kZ`cþY Ki þZ cvi te |

8.1 R`wgvZK hv³ c×wZ

cŰZÁv : R`wgvZþZ th mKj welþqi Avþj vPbv Kiv nq, mvavi Yfvte Zvþ`i cŰZÁv ej v nq |

m`úv` : th cŰZÁvq þKvþv R`wgvZK welq A¼b Kþi t`Lvþv nq Ges hv³ Øviv A¼þbi wbfþZv cþY Kiv hvq, GþK m`úv` ej v nq |

m`úvþ`i weifbþAsk:

- (K) DcvĚ : m`úvþ` hv t`Iqv _vþK, ZvB DcvĚ |
- (L) A¼b : m`úvþ` hv Ki Yxq, ZvB A¼b |
- (M) cþY : hv³ Øviv A¼þbi wbfþZv hvPvB ntj v cþY |

Dccv` : th cŰZÁvq þKvþv R`wgvZK welqþK hv³ Øviv cŰZwŰZ Kiv nq, GþK Dccv` etj | Dccvþ`i weifbþAsk:

- (K) mvavi Y wbeþb: G Astk cŰZÁvi welqvU mij fvte eYþv Kiv nq |
- (L) wetkl wbeþb: G Astk cŰZÁvi welqvU wPĤ Øviv wetkl fvte t`Lvþv nq |
- (M) A¼b: G Astk cŰZÁv mgvavþbi ev cþYþYi Rb` AwZwi³ A¼b Ki þZ nq |
- (N) cþY: G Astk `Ztvm×,tj v Ges cþe`wWZ R`wgvZK mZ` e`envi Kþi Dchy³ hv³ Øviv cŰ-wiez welqvUþK cŰZwŰZ Kiv nq |

AbjmvŠ-: þKvþv R`wgvZK cŰZÁv cŰZwŰZ Kþi Gi vm×vŠ-tþK GK ev GKwaK th bZb vm×vŠ-MŰY Kiv hvq, Gt`i þK AbjmvŠ-ej v nq |

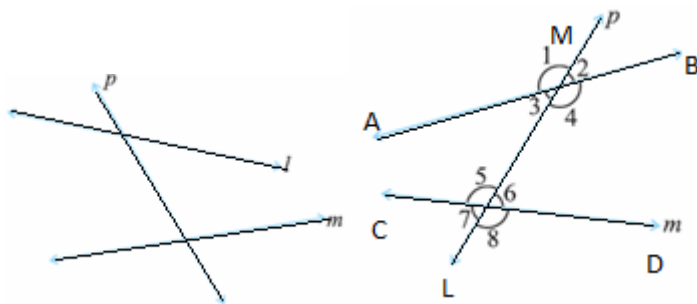
AvaybK hv³gj K R`wgvZi Avþj vPbi Rb` wKQzþgšuj K `xKvh,msÁv I wPþyi cþqvRb nq |

R'wgwZtZ e'eüZ wPýmgn

wPý	A_©	wPý	A_©
+	thvM	∠	†KvY
=	mgvb	⊥	j ¼^
>	epĒi	Δ	wĪ fR
<	¶ĭ Zi	⊙	eĒ
≅	meŋg	∴	thġnZĭ
	mgvšivj	∴	mZivs , AZGe

8.2 tQ`K

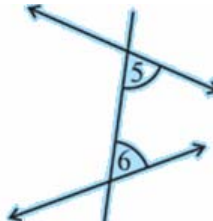
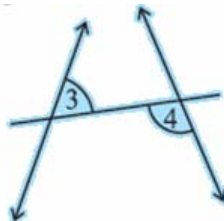
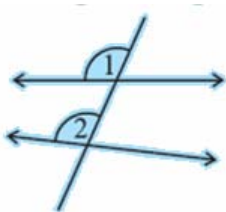
†Kvġbv mij ģiLv `ß ev ZtZwaK mij ģiLv†K wewfboe> ģZ tQ`K ġtġ G†K tQ`K etġ |
wP†Ī, $AB \parallel CD$ `ßwU mij ģiLv Ges LM mij ģiLv tm,tġv†K `ßwU wfbome>y P, Q tZ tQ`K ġtġQ |
 LM mij ģiLv $AB \parallel CD$ mij ģiLv†qi tQ`K | tQ`KwU $AB \parallel CD$ mij ģiLv `ßwU mvt_ tgvU
AvUwU †KvY `Zwi ġtġQ | †KvY,tġv†K $\angle 1, \angle 2, \angle 3, \angle 4, \angle 5, \angle 6, \angle 7, \angle 8$ Øviv wbt`R Kwĭ |
†KvY,tġv†K Ašt`'I ewnt`', Abj e I GKvšġ GB Pvi tKŲtZ fVŲ Kiv hvq |



Ašt`'†KvY	$\angle 3, \angle 4, \angle 5, \angle 6$
ewnt`'†KvY	$\angle 1, \angle 2, \angle 7, \angle 8$
Abj e †KvY †Rvov	$\angle 1$ Ges $\angle 5, \angle 2$ Ges $\angle 6$ $\angle 3$ Ges $\angle 7, \angle 4$ Ges $\angle 8$
Ašt`'GKvšġ †KvY †Rvov	$\angle 3$ Ges $\angle 6, \angle 4$ Ges $\angle 5$
ewnt`'GKvšġ †KvY †Rvov	$\angle 1$ Ges $\angle 8, \angle 2$ Ges $\angle 7$
tQ`†Ki GKB cvġki Ašt`'†KvY †Rvov	$\angle 3$ Ges $\angle 5, \angle 4$ Ges $\angle 6$

Abje tKvY₃tj vi ^{en}kó: (K) kxl ^{we}yAvj v`v (L) tQ` tKi GKB cvtk Aew`Z |
 GKvŠt tKvY₃tj vi ^{en}kó: (K) kxl ^{we}yAvj v`v (L) tQ` tKi weciXZ cvtk Aew`Z
 (M) mij ti Lv `BwU gta` Aew`Z |

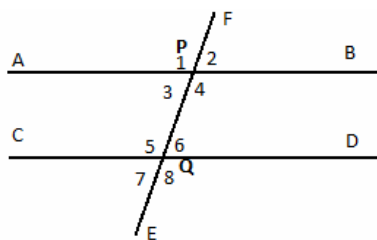
KvR

1 | (K) wPti i tKvY₃tj v tRvovq tRvovq kbv³ Ki |(L) $\angle 3 \parallel \angle 6$ Gi Abje tKvY t`Lv |(M) $\angle 4$ Gi wecZxc tKvY Ges $\angle 1$ Gi m^uúK tKvY wbt`R Ki |

8.3 tRvov mgvŠt+j mij ti Lv

Avgiv tRtbwQ th, GKB mgZtj Aew`Z `BwU mij ti Lv GtK AcitK tQ` bv Kitj tm₃tj v mgvŠt+j mij ti Lv | `BwU mgvŠt+j mij ti Lv t₃tK thtKvfbv `BwU ti Lvsk wbtj, ti Lvsk `BwU ci`úi mgvŠt+j nq | `BwU mgvŠt+j mij ti Lvi GKwU thtKvfbv we`yt₃tK AcinU j ^uúZi me^v mgvb | Avevi `BwU mij ti Lvi GKwU thtKvfbv `BwU we`yt₃tK AcinU j ^uúZi ci`úi mgvb ntj | ti LvØq mgvŠt+j | GB j ^uúZi tK `BwU mgvŠt+j ti LvØtqi t₃Ziej v nq |

j ¶ Kwí, tKvfbv wbw`Ø mij ti Lvi Dci Aew`Z bq Gi e we`y ga` w`tq H mij ti Lvi mgvŠt+j Kti GKwU gvT mij ti Lv AwKv hvq |



Dctii wPti, $AB \parallel CD$ `BwU mgvŠt+j mij ti Lv Ges EF mij ti Lv tm₃tj v tK `BwU we`y P | Q tZ tQ` Kti tQ | EF mij ti Lv $AB \parallel CD$ mij ti LvØtqi tQ` K | tQ` KwU $AB \parallel CD$ mij ti Lv `BwU mvt₃ $\angle 1, \angle 2, \angle 3, \angle 4, \angle 5, \angle 6, \angle 7, \angle 8$ tgvU AvUwU tKvY `Zwi Kti tQ | G tKvY₃tj vi gta`

(K) $\angle 1$ Ges $\angle 5, \angle 2$ Ges $\angle 6, \angle 3$ Ges $\angle 7, \angle 4$ Ges $\angle 8$ ci`úi Abje tKvY |(L) $\angle 3$ Ges $\angle 6, \angle 4$ Ges $\angle 5$ ntj v ci`úi GKvŠt tKvY |(M) $\angle 3, \angle 4, \angle 5, \angle 6$ AŠt` tKvY |

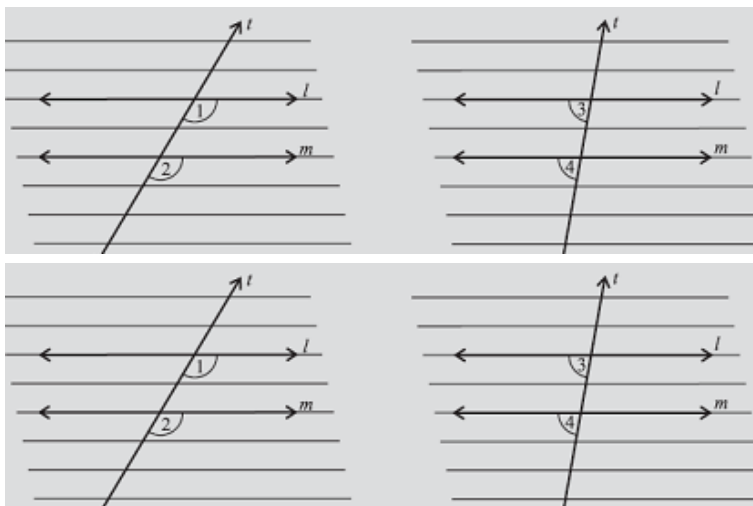
GB GKvšit I Abje tKvY, tj vi gta" mæúK⁹ tqtQ | GB mæúK⁹ ei Kivi Rb" j MZfvte wbtPi KvRw
Ki:

KvR :

1 | i"j Uvov GKcðv KvMtR wPtIi b'vq `Bw mgvšivj mij ti Lv I Gt`i GKw tQ`K AwK | `B tRvov Abje tKvY wPwY Z Ki | cðZ tRvov Abje tKvY mgvb wKbv hvPvB Ki | mgvb ntqtQ wK?

2 | `B tRvov GKvšit tKvY wPwY Z Ki | cðZ tRvov GKvšit tKvY mgvb wKbv hvPvB Ki | mgvb ntqtQ wK?

3 | mgvšivj mij ti Lv tqi tQ`tki GKB cvtki Ašt` tKvY `Bw ci gvc Ki | tKvY `Bw ci gvtci thvMdj tei Ki | thvMdj tZigvi mncvxt`i tei Kiv thvMdtji mvt_ Zj bv Ki | tZvgv`i thvMdj mgvb Kg-tenk 180° ntqtQ wK?



KvRi djvdj ch⁹ vPbv Kti Avgiv wbtPi wmvš-DcbxZ nB:

- `Bw mgvšivj mij ti Lvi GKw tQ`K ðviv DrcbæcðZ`K Abje tKvY tRvov mgvb nte |
- `Bw mgvšivj mij ti Lvi GKw tQ`K ðviv DrcbæcðZ`K GKvšit tKvY tRvov mgvb nte |
- `Bw mgvšivj mij ti Lvi GKw tQ`K ðviv DrcbæcðZ`tki GKB cvtki Ašt` tKvY `Bw ci`ui mæúK |

wel qw mntR gtb ivLvi Rb" j ¶ Ki :

Abje tKvY tRvov **F** etY⁹ Avi GKvšit tKvY tRvov **Z** etY⁹ wPwY Z |

mgvšivj mij ti Lvi GB wZbw ag⁹ Avj v`vfvte cðvY Kiv hvq bv | Gt`i thtKvbtv GKw tK mij ti Lvi msÁv wntmte wetePbv Kti ewK `Bw ag⁹ cðvY Kiv hvq |

msÁv : `Bw mij ti Lvi GKw tQ`K ðviv Drcbæc Abjfc tKvY tRvov mgvb ntj ti Lv tqi mgvšivj |

Diketahui :

Sebuah garis lurus AB dan CD sejajar. Garis PQ memotong AB dan CD di titik E dan F masing-masing. Sudut AEF dan EFD adalah sudut dalam beraturan.

Diketahui : $AB \parallel CD$ dan PQ memotong AB dan CD di titik E dan F masing-masing. Sudut AEF dan EFD adalah sudut dalam beraturan.

Diketahui :

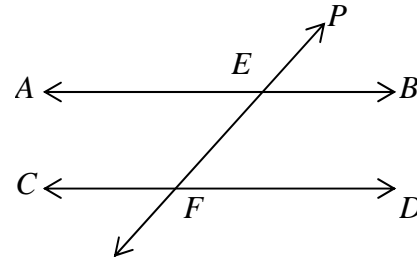
atau :

$$(1) \angle PEB = \text{sehadap} \angle EFD$$

$$(2) \angle PEB = \text{sehadap} \angle AEF$$

$$\therefore \angle AEF = \angle EFD$$

[diketahui]



atau :

[diketahui] $\angle PEB$ dan $\angle EFD$ adalah sudut sehadap.

[diketahui] $\angle PEB$ dan $\angle AEF$ adalah sudut sehadap.

[(1) dan (2) sama]

Diketahui :

1) Sebuah garis lurus AB dan CD sejajar. Garis PQ memotong AB dan CD di titik E dan F masing-masing. Sudut AEF dan EFD adalah sudut dalam beraturan.

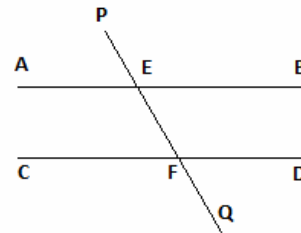
Diketahui : $AB \parallel CD$ dan PQ memotong AB dan CD di titik E dan F masing-masing.

F memotong AB dan CD di titik E dan F masing-masing.

misalnya, (K) $\angle AEF = \text{sehadap} \angle EFD$

$$(L) \angle PEB = \text{sehadap} \angle EFD$$

$$(M) \angle BEF + \angle EFD = \text{sehadap} \angle KVF$$



Diketahui :

1) Sebuah garis lurus AB dan CD sejajar. Garis PQ memotong AB dan CD di titik E dan F masing-masing. Sudut AEF dan EFD adalah sudut dalam beraturan.

Ketahui : $AB \parallel CD$ dan PQ memotong AB dan CD di titik E dan F masing-masing.

Sebuah garis lurus AB dan CD sejajar. Garis PQ memotong AB dan CD di titik E dan F masing-masing. Sudut AEF dan EFD adalah sudut dalam beraturan.

Sebuah garis lurus AB dan CD sejajar. Garis PQ memotong AB dan CD di titik E dan F masing-masing. Sudut AEF dan EFD adalah sudut dalam beraturan.

Sebuah garis lurus AB dan CD sejajar. Garis PQ memotong AB dan CD di titik E dan F masing-masing. Sudut AEF dan EFD adalah sudut dalam beraturan.

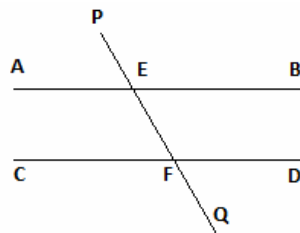
1) $\widehat{P\hat{I}}$, $AB \parallel CD$ ti Lv $\widehat{Q\hat{I}K}$ PQ ti Lv h_v μ t γ $E \mid F$
 $\widehat{e\text{v}} \text{ } \widehat{Z} \text{ } \widehat{tQ}$ K \hat{I} t \hat{Q} Ges

(K) $\angle AEF = \text{GKvš} \angle EFD$

A ev , (L) $\angle PEB = \text{Abj} \angle EFD$

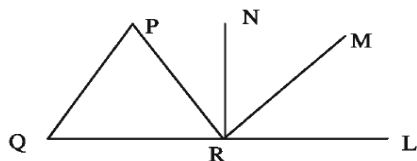
A ev , (M) $\angle BEF + \angle EFD = \text{ } \beta \text{ mg} \hat{I} \text{KvY}$

m \hat{Z} iv, $AB \parallel CD$ ti Lv β W ci \hat{u} i mgvšivj



Ab \hat{K} xj bx 8

1|



$\widehat{P\hat{I}}$, $\angle PQR = 55^\circ$, $\angle LRN = 90^\circ$ Ges $PQ \parallel MR$ ntj, $\angle MRN$ Gi gvb \widehat{tP} i $\hat{I} \text{Kv} \widehat{tQ}$?

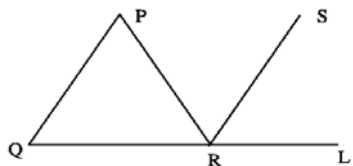
K. 35°

L. 45°

M. 55°

N. 90°

2|



$\widehat{P\hat{I}}$, $PQ \parallel SR$, $PQ = PR$ Ges $\angle PRQ = 50^\circ$ ntj, $\angle LRS$ Gi gvb \widehat{tP} i $\hat{I} \text{Kv} \widehat{tQ}$?

K. 80°

L. 50°

M. 55°

N. 75°

3| ABC mgv \widehat{tP} $\widehat{I} \text{f} \hat{R}$ fig BC Gi mgvšivj EF ti Lv AB Ges $AC \hat{I} K$ E, F $\widehat{e\text{v}} \text{ } \widehat{Z} \text{ } \widehat{tQ}$
 K \hat{I} t \hat{Q} $\angle B = 52^\circ$ ntj, $\angle A + \angle F$ Gi gvb \widehat{tP} i $\hat{I} \text{Kv} \widehat{tQ}$?

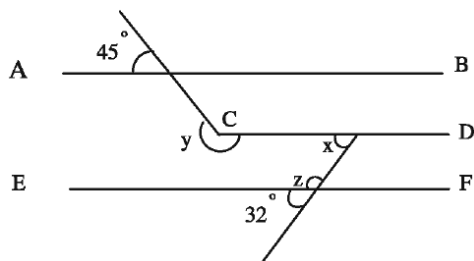
K. 76°

L. 104°

M. 128°

N. 156°

4|



$AB \parallel CD \parallel EF$

(1) $\angle X$ Gi gvb wɔɔPi tKvbW ?

K. 28° L. 32° M. 45° N. 58°

(2) $\angle Z$ Gi gvb wɔɔPi tKvbW ?

K. 58° L. 103° M. 122° N. 148°

(3) wɔɔPi tKvbW $y - z$ Gi gvb ?

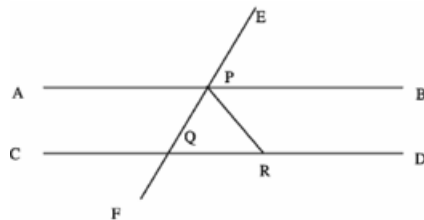
K. 58° L. 77° M. 103° N. 122°

- 5| i. GKB ti Lvi Dci Aew⁻Z⁻ Bw mwbwZ tKvY ci⁻ui mgvb nɔZ cvɔi |
 ii. wecZxc tKvYɔɔqi mgwLbK GKB mij ti Lvq Aew⁻Z |
 iii. GKw ti Lvi ewnt⁻GKw we⁻yw⁻ɔq H ti Lvi mgvšivj GKwaK ti Lv AwKv hvq |

Dcɔi i Zɔ⁻i wfwEɔZ wɔɔPi tKvbW mwVK ?

K. i | ii L. i | iii M. ii | iii N. i, ii | iii

6|



wɔɔi, $AB \parallel CD$, $\angle BPE = 60^\circ$ Ges $PQ = PR$.

K. t⁻Lvi th, $\frac{1}{2} \angle APE = 60^\circ$

L. $\angle CQF$ Gi gvb tei Ki |

M. cɔvY Ki th, PQR GKw mgevû wɔ fR |

beg Aa"vq

ŵĭ fŕ

Avgiv tRtbiQ, ŵZbiU ti Lvsk Øviv Ave× tŕtĭ i mxgvti LvŕK ŵĭ fŕ ej v nq Ges ti Lvsk, tj vŕK ŵĭ fŕi evû eŕj | thŕKvŕbv `ßiU evûi mvaviY ve`ŕK kxlŕ`yej v nq | `ßiU evû kxlŕ`ŕZ th tKvY DrœœKŕi Zv ŵĭ fŕi GKŵ tKvY | ŵĭ fŕi ŵZbiU evû I ŵZbiU tKvY AvŕQ | evûŕfŕ` ŵĭ fŕ ŵZb cKvi : mgevû, mgvûevû I ŵelgevû | Avevi tKvYŕfŕ` I ŵĭ fŕ ŵZb cKvi : mŕŕKvYx, ŕj ŕKvYx I mgŕKvYx | ŵĭ fŕi evû ŵZbiU i`ŕNŕ mgvûŕK ŵĭ fŕi cwi mxgv ej v nq | Gi Avŕj vŕK ŵĭ fŕi Ab"vb" `ewkó" Ges ŵĭ fŕ mspvš-tgšj K Dccv` I A¼b ŵelŕq Avŕj vPbv Kiv ntqŕQ |

Aa"vq tktl ŵŕŕv_ŕv –

- ŵĭ fŕi Aŕŕ` I eint` tKvY eYØv KiŕZ cviŕe |
- ŵĭ fŕi tgšj K Dccv`, tj v cØvY KiŕZ cviŕe |
- ŵewfbœKZŕvŕŕŕ ŵĭ fŕ AŵKŕZ cviŕe |
- ŵĭ fŕi evû I tKvYi cvi`úwi K mœúKœ`envi Kŕi RœœŕŵŕK mgm"vi mgvavb KiŕZ cviŕe |
- ŵĭ fŕ tŕtĭ i fvg I D"pZv tgŕc tŕŕŕdj cwi gvc KiŕZ cviŕe |

9.1 ŵĭ fŕi ga"gv

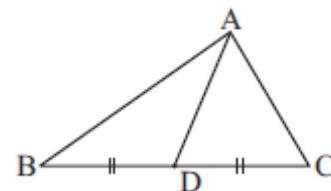
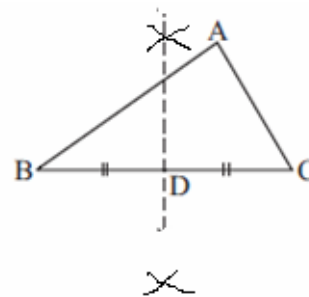
cŕŕki ŵŕŕŕ, ABC GKŵ ŵĭ fŕ | A, B, C ŵĭ fŕi ŵZbiU

kxlŕ`y | AB, BC, CA ŵĭ fŕi ŵZbiU evû Ges

$\angle A, \angle B, \angle C$ ŵZbiU tKvY | ŵĭ fŕi thŕKvŕbv GKŵ evû

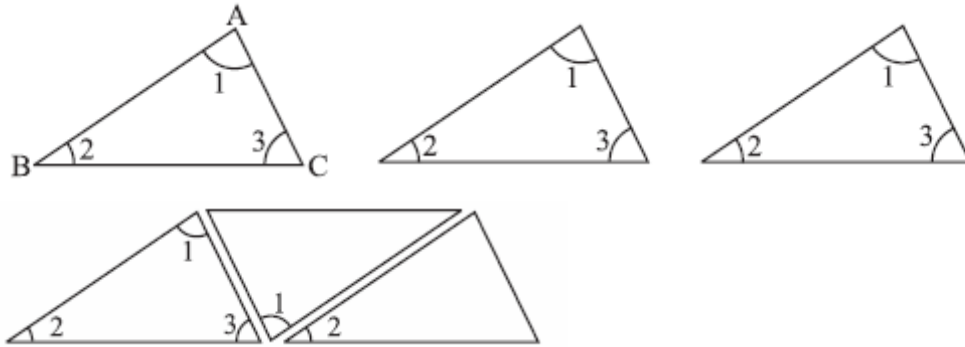
BC Gi ga"ve`y D ŵbYŕ Kwi Ges D ntZ ŵecixZ kxlŕ`y

A chŕ-ti Lvsk AŵK | AD , ABC ŵĭ fŕi GKŵ ga"gv |



ŵĭ fŕi kxlŕ`yŕt`ŕŕ ŵecixZ evûi ga"ve`ychŕ-Aŵ¼Z ti Lvsk ga"gv |

2| GKwU wî fR AwK Ges Gi Abjfc Avi I `BwU wî fR AwK| wî fR wZbwU wPîi b`vq mVRvI | tKvY wZbwU GKîi mij tKvY `Zwi Kîi wK?



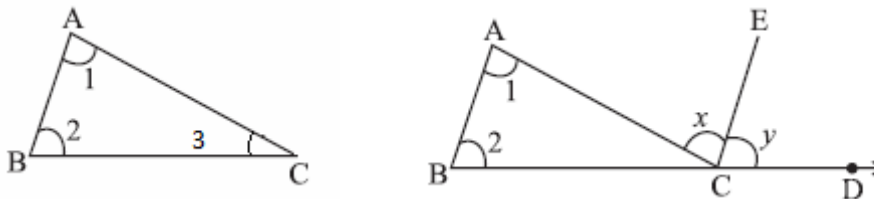
3| th tKvîbv wZbwU wî fR A¼b Ki | Pu`vi mvrvt`h` cîZwU wî fîRi tKvY,tj v cwigvc Ki Ges wîPî mviwYwU cîY Ki |

wî fR	tKvîYi cwigvc	tKvY,tj vi thvMdj
$\triangle ABC$	$\angle A =$ $\angle B =$ $\angle C =$	$\angle A + \angle B + \angle C$

cîZwU tîîi tKvY wZbwU thvMdj AvbgwîbK 180° nîqîQ wK?

9.4 wî fîRi wZb tKvîYi thvMdj

Dccv` 1| wî fîRi wZb tKvîYi mgwî `B mgîKvîYi mgvb|



wetkl wbePb : gîb Kwi, ABC GKwU wî fR|

cîvY KiîZ nte th, $\angle BAC + \angle ABC + \angle ACB =$ `B mgîKvY

A¼b : BC evîK D chS-ewîZ Kwi Ges BA tiLvi mgvîvîj Kîi CE tiLv AwK|

cōvY :

avc	h_v_Zv
(1) $\angle BAC = \angle ACE$	[BA CE Ges AC tiLv Zv` i tQ` K] [∴ GKvŠt tKvY `BvU mgvb]
(2) $\angle ABC = \angle ECD$	[BA CE Ges BD tiLv Zv` i tQ` K] [∴ Abje tKvY `BvU mgvb]
(3) $\angle BAC + \angle ABC = \angle ACE + \angle ECD = \angle ACD$	
(4) $\angle BAC + \angle ABC + \angle ACB = \angle ACD + \angle ACB$	[Dfqc†¶ $\angle ACB$ thvM Kti]
(5) $\angle ACD + \angle ACB =$ `B mg†KvY	[mi j tKvY Dccv`]
∴ $\angle BAC + \angle ABC + \angle ACB =$ `B mg†KvY	[cōvYZ]

Abjm×vŠ-1| wî f†Ri GKvU evû†K ewaZ Ki†j th ewnt` tKvY Drcbæng, Zv Gi weciXZ Ašt` tKvYØ†qi mgwó i mgvb|

Abjm×vŠ-2| wî f†Ri GKvU evû†K ewaZ Ki†j th ewnt` tKvY Drcbæng, Zv Gi Ašt` weciXZ tKvY `BvUi cØZ`KvU A†c¶v enEi |

Abjm×vŠ-3| mg†KvYx wî f†Ri m²†KvYØq ci`úi c†K|

Abjm×vŠ-4| mgevû wî f†Ri cØZ`KvU tKv†Yi cwi gvY 60°.

Abkxj bx 9.1

1| w††, $\triangle ABC$ Gi $\angle ABC = 90^\circ$, $\angle BAC = 48^\circ$ Ges BD, AC Gi Dci j †¶ AenKó tKvY ,†j vi gvb wby¶ Ki |

2| GKvU mgwØevû wî f†Ri kx†e`†Z Aew`Z tKvYvU i gvb 50°| AenKó tKvY `BvUi gvb wby¶ Ki |

3| cōvY Ki th, PZ††Ri PviU tKv†Yi mgwó Pvi mg†Kv†Yi mgvb|

4| `BvU tiLv PQ Ges RS ci`úi O we`†Z tQ` Kti | PQ Ges RS Gi Dci h_vµtg L I M Ges E I F PviU we`y thb, $LM \perp RS$, $EF \perp PQ$. cōvY Ki th, $\angle MLO = \angle FEO$.

5| $\triangle ABC$ -Gi $AC \perp BC$; E, AC Gi ewaZv†ki Dci th†Kv†bv we`y Ges $ED \perp AB$. ED Ges BC ci`úi†K O we`†Z tQ` Kti | cōvY Ki th, $\angle CEO = \angle DBO$.

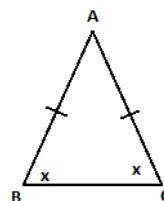
9.5 wî fRi evû l tKvYi mæúK©

wî fRi evû l tKvYi gta" mæúK© tqtQ | wêl qWU tevSvi Rb" wbtPi KvRwU Ki |

KvR :

1 | thtKvYi GKwU tKvYi AwK | tKvYi kxle> y t_tK DfQ evûZ mgvb `tZj` BwU we> y wPwYZ Ki | we> y` BwU hÿ³ Ki | GKwU mgwðevû wî fR AwZ ntj v | Pu"vi mrvth" fvg msj Mæ tKvY `BwU cwi gvc Ki | tKvY `BwU wK mgvb ?

hw" tKvYi wî fRi `BwU evû ci`úi mgvb nq, Zte Gt`i weciXZ tKvY `BwU ci`úi mgvb | ciwZ Aa"vtq GB cûZ AwU hÿ³ gj K cgvY Kiv nte | A_vr, ABC wî fR $AB = AC$ ntj, $\angle ABC = \angle ACB$ nte | mgwðevû wî fRi G `ewkó" wefbo hÿ³ gj K cgvY cûqM Kiv nq |



KvR :

1 | thtKvYi wZbWU wî fR AwK | i"j vti i mrvth" cûZwU wî fRi wZbWU evûi "N© l Pu"vi mrvth" wZbWU tKvY cwi gvc Ki Ges wbtPi mvi wYU cY©Ki |

wî fR	evûi cwi gvc	tKvYi cwi gvc	evûi Zj bv	tKvYi Zj bv
$\triangle ABC$	$AB =$ $BC =$ $CA =$	$\angle A =$ $\angle B =$ $\angle C =$		

cûZwU tqtQ tKvYi `BwU evû l Gt`i weciXZ tKvY t j v Zj bv Ki | G t_tK Kx wmvvš-DcbxZ n l qv hvq?

Dccv`" 2

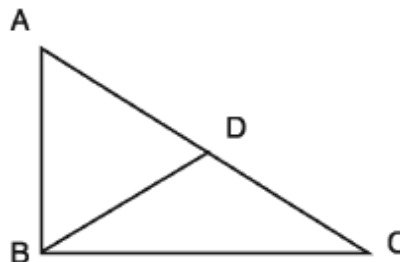
tKvYi wî fRi GKwU evû Aci GKwU evû Atc¶v epEi ntj, epEi evûi weciXZ tKvY ¶i Zi evûi weciXZ tKvY Atc¶v epEi nte |

wetkl wbePb: gtb Kwi, $\triangle ABC$ - G $AC > AB$.

cgvY Ki tZ nte th, $\angle ABC > \angle ACB$.

Awb : AC t_tK AB Gi mgvb Kti

AD Ask KwU Ges B, D thvM Kwi |



côvY:

avc

(1) $\triangle ABD$ - G $AB = AD$.

$\therefore \angle ADB = \angle ABD$.

(2) $\triangle BDC$ - G ewnt' $\angle ADB > \angle BCD$

$\therefore \angle ABD > \angle BCD$ বা $\angle ABD > \angle ACB$

(3) $\angle ABC > \angle ABD$

mjZivs, $\angle ABC > \angle ACB$ (côvwYZ)|

h_v_Zv

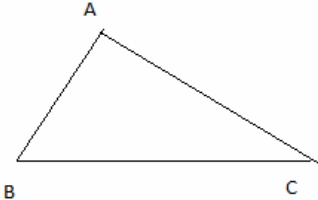
[mgvðevû wî fîRi fwg msj MæKvYðq mgvb|]

[ewnt' tKvY weciXZ Ašt' tKvY `Bwî
côZ'KwU Atc¶v epÊi]

[$\angle ABD$ tKvYwU $\angle ABC$ Gi GKwU Ask]

Dccv` 3

tKvðbv wî fîRi GKwU tKvY Aci GKwU tKvY Atc¶v epÊi ntj, epÊi tKvYi weciXZ evû ¶î Zi tKvYi weciXZ evû Atc¶v epÊi |

weþkl wePb: gtb Kwî, $\triangle ABC$ Gi $\angle ABC > \angle ACB$ côvY KiþZ nte th, $AC > AB$ côvY:	
avc	h_v_Zv
(1) hw` AC evû AB evû Atc¶v epÊi bv nq, Zte (i) $AC = AB$ A_ev (ii) $AC < AB$ nte	
(i) hw` $AC = AB$ nq, $\angle ABC = \angle ACB$ wKš' kZðhvqx $\angle ABC > \angle ACB$ Zv cð Ê kZðetivax	[mgvðevû wî fîRi fwg msj MæKvYðq mgvb]
(ii) Avevi, hw` $AC < AB$ nq, Zte $\angle ABC < \angle ACB$ nte wKš' Zv-l cð Ê kZðetivax	[¶î Zi evû weciXZ tKvY ¶î Zi]
(2) mjZivs, AC evû AB Gi mgvb ev AB t_tK ¶î Zi ntZ cvti bv $\therefore AC > AB$ (côvwYZ)	

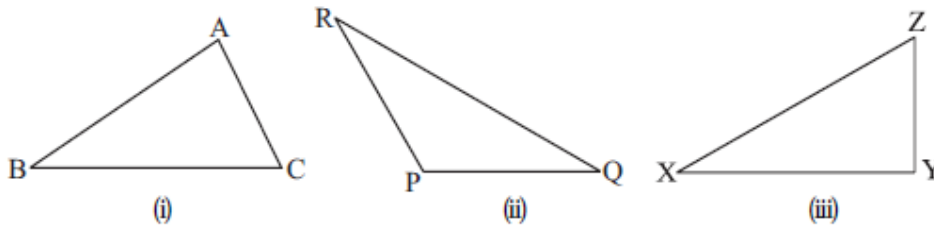
9.6 11 fRi `B evûi `N^o thvMdj

11 fRi thtKvfbv `B evûi `N^o mgwôl mvt_ ZZxq evûi `N^o mûK^o tqtQ | mûK^o Abvætbi Rb`
`j MZfvte wbtPi KvRw Ki |

KvR

1 | 15w newfbegvæci Kwv tRvMvo Ki | Gt`i thtKvfbv wZbw w tq GKw 11 fR `Zwi Kivi tPón Ki | tZvgiv
wK cûZevi B 11 fR `Zwi Ki tZ cvi tQv? KLB cvi tQv bv Zvi e`vL`v`v |

2 | thtKvfbv wZbw 11 fR $\triangle ABC$, $\triangle PQR$ | $\triangle XYZ$ AwK |



i`jvæi i mrvæth` 11 fRi evû t`jvi `N^o gvc Ges wbtPi mvi wYw cæY Ki :

11 fR	wZb evûi `N ^o	mZ` wKbv	mZ`/wq_`v
$\triangle ABC$	AB ____ BC ____ CA ____	$AB - BC < CA$ $___ + ___ > ___$ $BC - CA < AB$ $___ + ___ > ___$ $CA - AB < BC$ $___ + ___ > ___$	
$\triangle PQR$	PQ ____ QR ____ RP ____	$PQ - QR < RP$ $___ + ___ > ___$ $QR - RP < PQ$ $___ + ___ > ___$ $RP - PQ < QR$ $___ + ___ > ___$	
$\triangle XYZ$	XY ____ YZ ____ ZX ____	$XY - YZ < ZX$ $___ + ___ > ___$ $YZ - ZX < XY$ $___ + ___ > ___$ $ZX - XY < YZ$ $___ + ___ > ___$	

j ¶ Kwí, thtKvfbv 11 fRi thtKvfbv `B evûi `N^o thvMdj Gi ZZxq evûi `N^o Aæc¶v tenk | Argiv
Avi | j ¶ Kwí, thtKvfbv 11 fRi thtKvfbv `B evûi `N^o wætvMdj Gi ZZxq evûi `N^o Aæc¶v Kg |

Dccv` 4

ŵ fŕi thŕKvŕbv `ß evûi `Nŕi mgwó Gi ZZxq evûi `NŕAŕcŕv epĒi |

wetkl wbePb: gŕb Kwi, ABC GKŵ ŵ fR | cŕvY

KiŕZ nŕe th, $\triangle ABC$ Gi thŕKvŕbv `ß evûi `Nŕi

mgwó Gi ZZxq evûi `NŕAŕcŕv epĒi |

awi, BC ŵ fRŵi epĒg evû | Zvntj

$AB + AC > BC$ cŕvY Ki vB hŕó |

Aŕb : BA ŕK D chŕ-ewaZ Kwi, thb $AD = AC$

nq | C, D thM Kwi |

cŕvY :

avc

(1) $\triangle ADC$ - G $AD = AC$.

$\therefore \angle ACD = \angle ADC. \therefore \angle ACD = \angle BDC$.

(2) $\angle BCD > \angle ACD$.

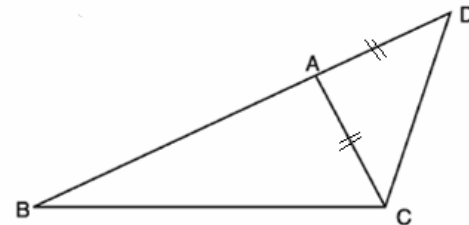
$\therefore \angle BCD > \angle BDC$.

(3) $\triangle BCD$ G $\angle BCD > \angle BDC$.

$\therefore BD > BC$.

(4) $ŵŕŕ'BD = AB + AD = AB + AC$

$\therefore AB + AC > BC$. (cŕvY)



h_v_Zv

[mgwóevû ŵ fŕi fŕg msj MŕKvYŕq mgvb]

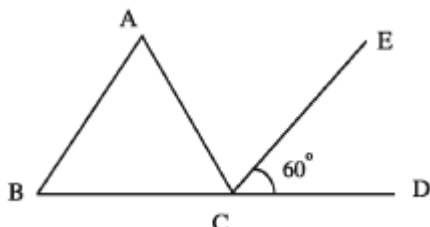
[KviY $\angle ACD, \angle BCD$ Gi GKŵ Ask]

[epĒi ŕKvŕYi weciXZ evû epĒi]

[thŕnZl $AC = AD$]

Abŕxj bx 9.2

wbŕPi Zŕ_i wŕvĒŕZ 1-3 bŕŕ cŕkŕ DĒi `vl :



wŕŕĒ, ABC Gi BC evûŕK D chŕ-ewaZ Kiv ntŕŕQ | $CE, \angle ACD$ Gi mgwóLŕK |

$AB \parallel CE$ Ges $\angle ECD = 60^\circ$

- 1| $\angle BAC$ Gi gvb wbþPi tKvbWU?
K. 30° L. 45° M. 60° N. 120°
- 2| $\angle ACD$ Gi gvb wbþPi tKvbWU?
K. 60° L. 90° M. 120° N. 180°
- 3| $\triangle ABC$ tKvb aiþbi wî fR?
K. ãj tKvYx L. mgwðevû M. mgevû N. mgþKvYx
4. $\triangle ABC$ G $\angle A = 70^\circ$, $\angle B = 40^\circ$ ntj $\triangle ABC$ Kx aiþbi wî fR?
K. ãj tKvYx L. mgþKvYx M. mgevû N. mgwðevû
- 5| GKW wî fRi ðWU evû h_vµtg 5 tm.wg. Ges 4 tm.wg. wî fRi Aci evûWU wbþPi tKvbWU ntZ cvþi?
K. 1 tm.wg. L. 4 tm.wg. M. 9 tm.wg. N. 10 tm.wg.
- 6| mgwðevû wî fRi mgvb evûðqtK ewaZ Ki tj Drcbæwnt ã tKvYðtqi GKW 120° ntj, AciWU KZ?
K. 120° L. 90° M. 60° N. 30°
- 7| mgþKvYx wî fRi m²tKvYðtqi GKW 40° ntj, Aci m²tKvYi gvb wbþPi tKvbWU?
K. 40° L. 45° M. 50° N. 60°
- 8| tKvþbv wî fRi GKW tKvY Aci ðWU tKvYi mgwói mgvb ntj, wî fRWU Kx aiþbi nte?
K. mgevû L. m²tKvYx M. mgþKvYx N. ãj tKvYx
- 9| $\triangle ABC$ -G $AB > AC$ Ges $\angle B < \angle C$ Gi mgwðLðKðq ci úi P we`jZ tQ` KþitQ| cðvY Ki th, $PB > PC$.
- 10| ABC GKW mgwðevû wî fR Ges Gi $AB = AC$; BC tK thtKvþbv ðtZi D chS-evovþbv ntj v| cðvY Ki th, $AD > AB$.
- 11| $ABCD$ PZfR $AB = AD$, $BC = CD$ Ges $CD > AD$.
cðvY Ki th, $\angle DAB > \angle BCD$.

12| $\triangle ABC$ - გ $AB = AC$ Ges D, BC -Gi Dci GKUL მე-12| $cgvY$ Ki th, $AB > AD$.

13| $\triangle ABC$ - გ $AB \perp AC$ Ges D, AC -Gi Dci GKUL მე-12| $cgvY$ Ki th, $BC > BD$.

14| $cgvY$ Ki th, $mg\ddot{t}KvYx$ $\widehat{w\ddot{t}}$ f\ddot{t}Ri $AwZf\ddot{R}$ en\ddot{E}g ev\ddot{u}|

15| $cgvY$ Ki th, $\widehat{w\ddot{t}}$ f\ddot{t}Ri en\ddot{E}g ev\ddot{u}i $wecixZ$ tKvY en\ddot{E}g|

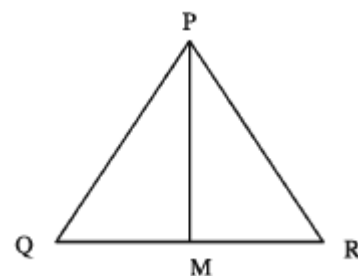
16| $\widehat{w\ddot{t}}$ f\ddot{t}Ri, $PM \perp QR$, $\angle QPM = \angle RPM$ Ges

$$\angle QPR = 90^\circ$$

K. $\angle QPM$ Gi gvb $wbY\ddot{q}$ Ki |

L. $\angle PQM$ | $\angle PRM$ Gi gvb KZ?

M. $PQ = 6$ tm.wg. ntj, PR Gi gvb $wbY\ddot{q}$ Ki |



9.7 $\widehat{w\ddot{t}}$ f\ddot{t}Ri A $\frac{1}{4}$ b

$c\ddot{t}Z$ K $\widehat{w\ddot{t}}$ f\ddot{t}Ri $OqvU$ Ask Av\ddot{t}Q; $wZbwU$ ev\ddot{u} Ges $wZbwU$ tKvY| $\widehat{w\ddot{t}}$ f\ddot{t}Ri GB $OqvU$ Astki KtqKwU Aci GKwU $\widehat{w\ddot{t}}$ f\ddot{t}Ri Abje Astki $mgvb$ ntj $\ddot{B}wU$ $\widehat{w\ddot{t}}$ f\ddot{t}Ri $me\ddot{m}g$ ntZ cv\ddot{t}i | $myZivs$ tKej H Ask $\ddot{t}j$ v t\ddot{t} I qv \ddot{v} Ktj $\widehat{w\ddot{t}}$ f\ddot{t}Ri AvKvi $wb\ddot{w}$ \ddot{t} nq Ges $\widehat{w\ddot{t}}$ f\ddot{t}Ri AvKv hvq| $wb\ddot{t}Pi$ Dcv\ddot{E} $\ddot{t}j$ v Rvbv \ddot{v} Ktj GKwU $wb\ddot{w}$ \ddot{t} $\widehat{w\ddot{t}}$ f\ddot{t}Ri $mnt\ddot{R}B$ AvKv hvq:

(1) $wZbwU$ ev\ddot{u},

(2) $\ddot{B}wU$ ev\ddot{u} | G\ddot{t} i A\ddot{S}f\ddot{t}Ri tKvY,

(3) GKwU ev\ddot{u} | G\ddot{t} i msj Me\ddot{t} $\ddot{B}wU$ tKvY,

(4) $\ddot{B}wU$ tKvY | G\ddot{t} i GKwU $wecixZ$ ev\ddot{u},

(5) $\ddot{B}wU$ ev\ddot{u} | G\ddot{t} i GKwU $wecixZ$ tKvY,

(6) $mg\ddot{t}KvYx$ $\widehat{w\ddot{t}}$ f\ddot{t}Ri $AwZf\ddot{R}$ | Aci GKwU ev\ddot{u} A \ddot{v} tKvY|

მ \ddot{w} u\ddot{v} \ddot{t} 1

tKv\ddot{t}bv $\widehat{w\ddot{t}}$ f\ddot{t}Ri $wZbwU$ ev\ddot{u} t\ddot{t} I qv Av\ddot{t}Q, $\widehat{w\ddot{t}}$ f\ddot{t}Ri AvKtZ n\ddot{t}e|

g\ddot{t}b Kwi, GKwU $\widehat{w\ddot{t}}$ f\ddot{t}Ri $wZbwU$ ev\ddot{u} a, b, c t\ddot{t} I qv Av\ddot{t}Q|

$\widehat{w\ddot{t}}$ f\ddot{t}Ri AvKtZ n\ddot{t}e|

a _____
b _____
c _____

A¼b :

(1) thþKvþbv i wKþ BD t_þK a Gi mgvb Kþi BC tKtU wB|

(2) B | C weþ`þK tKþ`Kþi h_vþtg b Ges c Gi mgvb e`vmvaþbtq BC Gi GKB cvtk`þWU eþPvc Auk| eþPvc`þWU ci`úi A weþ`þZ tQ` Kþi |

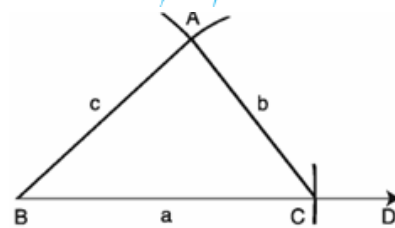
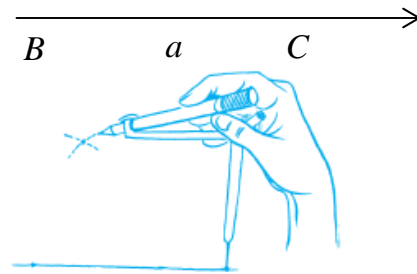
(3) A, B Ges A, C thvM Kwi |

Zvntþj $\triangle ABC$ -B Dwî ó wî fR|

cþvY : A¼bvþvntþi, $\triangle ABC$ ¼ $BC = a$, $AC = b$ Ges

$AB = c$.

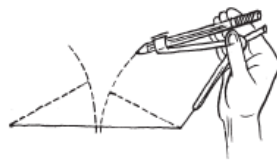
$\therefore \triangle ABC$ cð È evûhyþ wî fR|



KvR :

1| 8 tm.wg., 5 tm.wg. | 6 tm.wg. ã`þNþ wZbW evûwewkó GKW wî fR Auk|

2| 8 tm.wg., 5 tm.wg. | 3 tm.wg. ã`þNþ wZbW evûwewkó GKW wî fR A¼þbi tPón Ki |



tZvgvi tPón mdj ntqtQ wK?

gþe` : wî fRi`þ evûi mgwó Gi ZZxq evû Aþcþv enÈi | ZvB cð È evû,tjv Ggb ntZ nte th, thþKvþbv`þWU ã`þNþ mgwó ZZxqWU ã`NþAþcþv enÈi nq| Zvntþj B wî fRW Aukv mþe nte|

მუნი 2

ჩვენს მზის სისტემის გარშემო მზის სისტემის გარშემო მზის სისტემის გარშემო

გთხოვთ, გზის მზის სისტემის გარშემო a და b გზის სისტემის გარშემო
ჩვენს $\angle C$ და $\angle A$ გზის სისტემის გარშემო

პასუხი :

- (1) ჩვენს მზის სისტემის გარშემო BD და a გზის სისტემის გარშემო BC გზის
- (2) BC გზის სისტემის გარშემო C გზის სისტემის გარშემო $\angle C$ გზის სისტემის გარშემო $\angle BCE$ გზის

- (3) CE გზის სისტემის გარშემო b გზის სისტემის გარშემო CA გზის

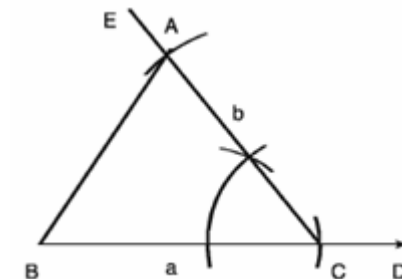
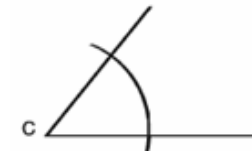
- (8) A, B გზის სისტემის გარშემო

გთხოვთ $\triangle ABC$ -ს გზის სისტემის გარშემო

პასუხი : პასუხი აბსოლუტურად,

$\triangle ABC$ -ს $BC = a, CA = b$ გზის $\angle ACB = \angle C$.

$\therefore \triangle ABC$ -ს გზის სისტემის გარშემო



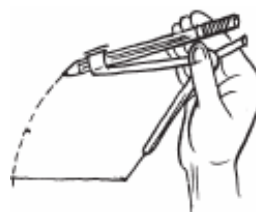
მუნი 3

ჩვენს მზის სისტემის გარშემო გზის სისტემის გარშემო მზის სისტემის გარშემო

გთხოვთ, გზის მზის სისტემის გარშემო a გზის სისტემის გარშემო
 $\angle B$ და $\angle C$ და $\angle A$ გზის სისტემის გარშემო

პასუხი :

- (1) ჩვენს მზის სისტემის გარშემო BD და a გზის სისტემის გარშემო BC გზის
- (2) BC გზის სისტემის გარშემო B და C გზის სისტემის გარშემო $\angle CBE = \angle B$ გზის
 $\angle BCF = \angle C$ გზის BE და CF გზის სისტემის გარშემო



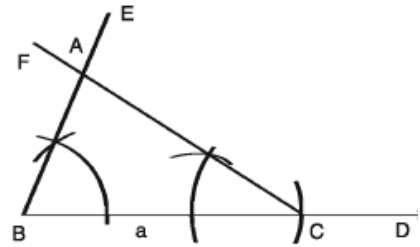
(3) $A, B \in A, C$ thvM Kwi |

Zvntj $\triangle ABC$ - B Dwî ó wî fR |

côvY : A¼b Abyvñi ,

$\triangle ABC$ - G $BC = a$, $\angle ABC = \angle B$ Ges $\angle ACB = \angle C$.

$\therefore \triangle ABC$ - B wlv ð wî fR |



gšē : wî fRi wZb tKvYi mgwó ð mgñKvYi mgvb, ZvB cð Ê tKvY ð Bw Ggb ntZ nte thb Gñ i mgwó ð mgñKvY Añcñv tQvU nq | GB kZñvj b Kiv bv ntj tKvñbv wî fR AwKv mñe nte bv |

KvR :

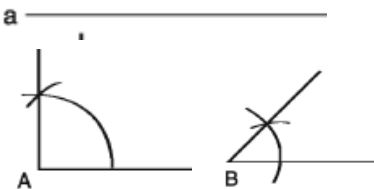
1 | 7 tm.wg. ðññ evú | 50° | 60° tKvñwñkó GKwU wî fR AwK |

2 | 6 tm.wg. ðññ evú | 140° | 70° tKvñwñkó GKwU wî fR A¼ñbi tPón Ki | tZvgvi tPón mdj ntñtQ wK? tKb evñLñ Ki |

mñvññ 4

tKvñbv wî fRi ð Bw tKvY Ges Gñ i GKwU wñcixZ evú tñ I qv AvñQ, wî fRw AwññZ nte |

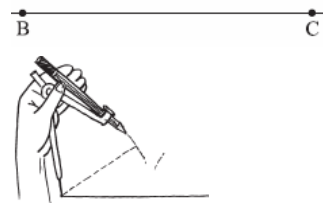
gñb Kwi, GKwU wî fRi ð Bw tKvY $\angle A$ | $\angle B$ Ges $\angle A$ Gi wñcixZ evú a tñ I qv AvñQ | wî fRw AwññZ nte |



A¼b :

(1) thñKvñbv iñkñ BD tññK a Gi mgvb Kñi BC wlvB |

(2) BC tiLvññki B | C wññññZ $\angle B$ Gi mgvb Kñi $\angle CBF$ | $\angle DCE$ AwñK |



(3) Avevi CE tiLvi C wññññZ Gi th cvñk $\angle B$ AewñZ Zvi

wñcixZ cvñk $\angle A$ Gi mgvb Kñi $\angle ECG$ AwñK |

CG | BF tiLv A wññññZ tññ Kñi |

\therefore wî fR ABC B Dwî ó wî fR |

cđvY : A¼bvbmvti, $\angle ABC = \angle ECD$. GB tKvY `Bw Abj e

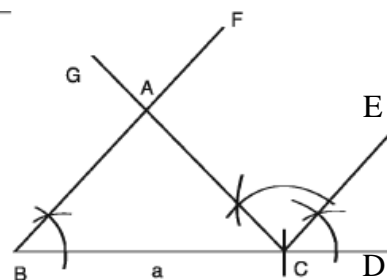
etj $BF \parallel CE$ ev $BA \parallel CE$ |

GLb $BA \parallel CE$ Ges AC Gt`i tQ`K |

$\therefore \angle BAC = \text{GKvŠt } \angle ACE = \angle A$.

GLb $\triangle ABC$ G $\angle BAC = \angle A$, $\angle ABC = \angle B$ Ges

$BC = a$. mZivs, ABC w fRw kZgtZ AwZ ntj v |



mduv` 5

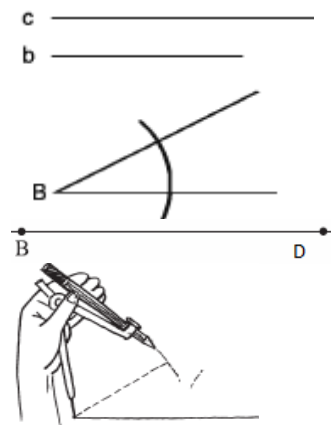
tKvbtv w fRi `Bw evu Ges Gt`i GKwI wecixZ tKvY t`I qv AvtQ, w fRw AwktZ nte |

gtb KwI, GKwI w fRi `Bw evu b | c Ges b evuI wecixZ tKvY $\angle B$ t`I qv AvtQ | w fRw AwktZ nte |

A¼b :

(1) tKvbtv iwkZ BD AwK |

(2) B we`Z cŁ E $\angle B$ Gi mgvb Kti $\angle DBE$ AwK |

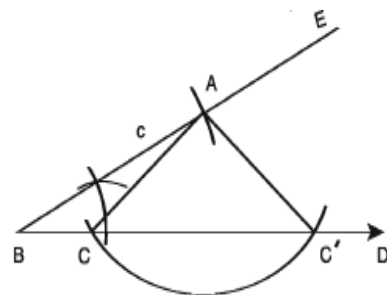


(3) BE tiLv t_K c Gi mgvb Kti BA wB |

(4) GLb A we`K tK`Kti b Gi `tNq mgvb e`vmaQbtq GKwI eEPvc AwK | eEPvcw BD tiLvK C | C' we`Z tQ` Kti |

(5) A, C Ges A, C' thvM KwI |

Zvntj $\triangle ABC$ Ges $\triangle ABC'$ -Dfq w fR cŁ E kZcY Kti AwZ |



cđvY : A¼bvbmvti, $\triangle ABC$ - G $BA = c$, $AC = b$ Ges $\angle ABC = \angle B$ |

Avei, $\triangle ABC'$ - G $BA = c$, $AC' = b$ Ges $\angle ABC' = \angle B$ |

t`Lv hvq, $\triangle ABC$ Ges $\triangle ABC'$ Dfq cŁ E kZmgn ciY Kti |

Zvntj $\triangle ABC$ ev $\triangle ABC'$ -B Duĩ ó w fR |

ԹԵՄԱ 6

Տրված է մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

Տրված է, որ եռանկյունի մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

Տրված է, որ եռանկյունի մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

Այսինքն։

(1) Տրված է մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

(2) B և E կետերը գտնվում են BE ուղիղի վրա։

(3) C կետը գտնվում է AC ուղիղի վրա, որի վրա A կետից $AC = a$ հեռավորության վրա գտնվում է E կետը, որից BE ուղիղի վրա B կետից $BE = b$ հեռավորության վրա գտնվում է E կետը։

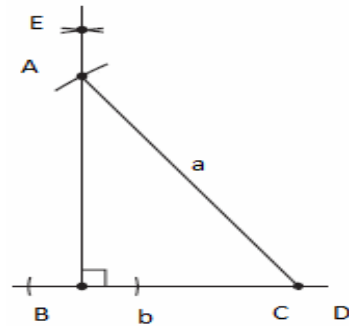
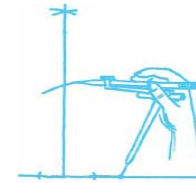
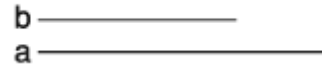
(4) A և C կետերը գտնվում են AC ուղիղի վրա։

Նշանակենք $\triangle ABC$ -ի մասին տեղեկություններ։

Տրված է, որ $AC = a$, $BC = b$ և $\angle ABC = \alpha$ ։

Գտնել $\angle ACB$ և $\angle BAC$ անկյունները։

Քանի որ $\triangle ABC$ -ի մասին տեղեկություններ։



ԹԵՄԱ 9.3

1) Տրված է մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

K. 1 L. 2 M. 3 N. 4

2) Տրված է մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

K. 1 րոպ., 2 րոպ. 3 րոպ. L. 3 րոպ., 4 րոպ. 5 րոպ.

M. 2 րոպ., 4 րոպ. 6 րոպ. N. 3 րոպ., 4 րոպ. 7 րոպ.

3) i. Գտնել մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

ii. Տրված է մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

iii. Տրված է մի քանի պայմաններով որոշվող եռանկյունի մասին տեղեկություններ։

Dctii Z_ Abymv̄i vb̄Pi tKvb̄U m̄VK

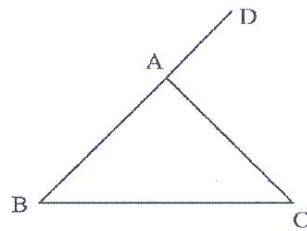
K. *i*

L. *ii* | *iii*

M. *i* | *iii*

N. *i*, *ii* | *iii*

vb̄Pi w̄P̄ Abymv̄i 4-5 b̄† c̄k̄e D̄Ei `v̄l :



4| C w̄e`jZ BA ti Lvi mgvš†vj ti Lv AuK†Z n̄†j , tKvb tKv†Yi mgvb tKvY AuK†Z n̄†e?

K. $\angle ABC$

L. $\angle ACB$

M. $\angle BAC$

N. $\angle CAD$

5| $\angle CAD$ Gi mgvb vb̄Pi tKvb̄U?

K. $\angle BAC + \angle ACB$

L. $\angle ABC + \angle ACB$

M. $\angle ABC + \angle ACB + \angle BAC$

N. $\angle ABC + \angle BAC$

6| GK̄U w̄l f̄†Ri w̄Zb̄U ev̄i `N̄†` I qv Av†Q | w̄l f̄R̄U AuK |

(K) 3 tm.wg., 4 tm.wg., 6 tm.wg.

(L) 3.5 tm.wg., 4.7 tm.wg., 5.6 tm.wg.

7| GK̄U w̄l f̄†Ri `B̄U ev̄i I G† i Ašf̄† tKvY †` I qv Av†Q | w̄l f̄R̄U AuK |

(K) 3 tm.wg., 4 tm.wg., 60°

(L) 3.8 tm.wg., 4.7 tm.wg., 45°

8| GK̄U w̄l f̄†Ri GK̄U ev̄i I Gi msj M̄e B̄U tKvY †` I qv Av†Q | w̄l f̄R̄U AuK |

(K) 5 tm.wg., 30° , 45°

(L) 4.5 tm.wg., 45° , 60°

9| GK̄U w̄l f̄†Ri `B̄U tKvY I c̄g tKv†Yi w̄cixZ ev̄i †` I qv Av†Q | w̄l f̄R̄U AuK |

(K) 120° , 30° , 5 tm.wg.

(L) 60° , 30° , 4 tm.wg.

10| GK̄U w̄l f̄†Ri `B̄U ev̄i I c̄g ev̄i w̄cixZ tKvY †` I qv Av†Q | w̄l f̄R̄U AuK |

(K) 5.3 tm.wg., 6 tm.wg., 60°

(L) 4 tm.wg., 5 tm.wg., 30°

11| GK̄U mg†KvYx w̄l f̄†Ri AwZfR I Gi msj M̄ev̄i `N̄†` I qv Av†Q | w̄l f̄R̄U AuK |

(K) 7.2 tm.wg., 4.5 tm.wg.

(L) 4.7 tm.wg., 3 tm.wg.

12| GK̄U mg†KvYx w̄l f̄†Ri GK̄U w̄b̄ † ev̄i 5.3 tm.wg. Ges GK̄U m̄†KvY 45° †` I qv Av†Q | w̄l f̄R̄U

AuK |

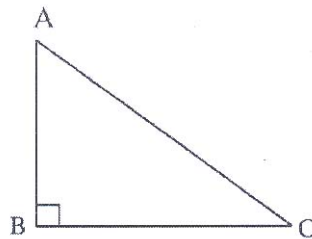
13| GKB mi j ti Lvq Aew⁻Z bq Ggb wZbwU we⁻y $A, B \mid C$.

K. we⁻ywZbwU w⁻ tq GKwU wî fR AwK|

L. Aw⁴Z wî fRi kx l we⁻yt⁻tk fngi l ci j π^A AwK|

M. Aw⁴Z wî fRi fng, mg⁺KvYx mgw⁰evû wî fRi AwZfR ntj , wî fRwU AwK|

14|



K. wP⁺î i wî fRwU AwZfR tKvbwU?

L. AwZfRi cwigvY tmwUwUv⁺i wby⁰ Ki Ges $\angle ACB$ Gi mgvb K⁺i GKwU tKvY AwK|

L. GKwU mg⁺KvYx wî fR AwK, hvi AwZfR wP⁺î Aw⁴Z wî fRi AwZfR A⁺c⁺¶v 2 tm.wg. eo Ges GKwU tKvY, $\angle ACB$ Gi mgvb nq|

15| GKwU wî fRi β wU evû $a = 3 \cdot 2$ tm.wg., $b = 4 \cdot 5$ tm.wg. Ges GKwU tKvY $\angle B = 30^\circ$

K. $\angle B$ Gi mgvb GKwU tKvY AwK|

L. GKwU wî fR AwK, hvi β evû $a \mid b$ Gi mgvb Ges Ašf⁰ $\angle B$ Gi mgvb nq|

M. Ggb GKwU wî fR AwK, hvi GKwU evû b Ges $\angle B$ Gi weci xZ evû .. nq|

16| wî fRi GKwU evûi $\sim N^0 4$ tm.wg. Ges evû msj ModKvY β wU $37^\circ \mid 46^\circ$.

K. wî fRi Aci tKv⁺Yi cwigvY KZ?

L. wî fRwU Kx ai tbi Ges tKb?

M. wî fRwU AwK|

kg Aa'vq meŋgZv I m`kZv

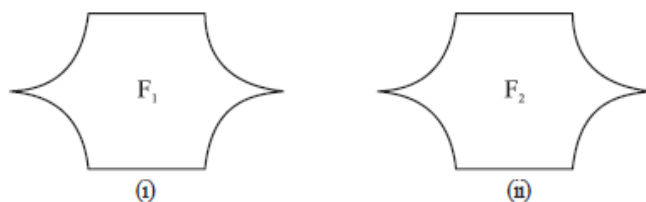
Avgt`i Pvi`tk wewfbaAvKwZ I AvKvtii e`t`LtZ cvB| Gt`i wKQz ueu mgvb, Avevi wKQz t`LtZ GKB iKg, wKŠ' mgvb bq| tZvgv`i tkwYi wkqV_ŋ`i MwYZ cvW`cy`KwU AvKwZ, AvKvi I IRtb GKB, tm,tjv mew`K w`tq mgvb ev meŋg| Avevi GKwU MtQi cvZv,tjvi AvKwZ GKB ntj I AvKvti wfbæ cvZv,tjv t`LtZ GK iKg ev m`k| dtUvMwidi t`vKvth hLb Avgiv gjKwci AwZwi³ Kwc PvB Zv gjKwci ueu mgvb, eo ev tQvU Kti PvBtZ cwii | KwcwU hw` gjKwci mgvb nq tmtq|t` Kwc `BwU meŋg| Avi t`j wK ti tL KwcwU hw` gjKwci tPtq eo ev tQvU nq tmtq|t` Kwc `BwU m`k| GB Aa'vtq Avgiv AZ`Š-„i“ZcY°GB `B R'wguZK aviYv wbtq AvtjvPbv Kie| Avgiv AvcvZZ mgZj xq tqt`i meŋgZv I m`kZv wetePbv Kie|

Aa'vq tktl wkqV_ŋv N

- wewfbaR'wguZK AvKvi I AvKwZ ntZ meŋg Ges m`k AvKvi I AvKwZ wPyZ Ki tZ cvi te|
- meŋgZv I m`kZvi gta` cv`R` Ki tZ cvi te|
- w`fRi meŋgZv cgvY Ki tZ cvi te|
- w`fR I PZy`fRi m`kZv e`vL`v Ki tZ cvi te|
- meŋgZv I m`kZvi `enkto`i wfwEtZ mnR mgm`vi mgvavb Ki tZ cvi te|

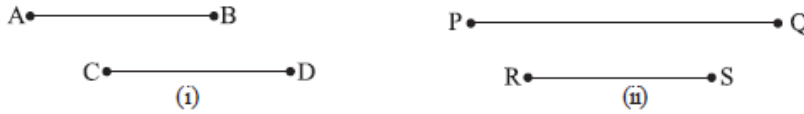
10.1 meŋgZv

wbtPi mgZj xq wP`T `BwU t`LtZ GKB AvKwZ I AvKvtii | wP`T `BwU meŋg wKbv wbwöZ nlqvi Rb` Dcwii cvZb c×wZ MwY Kiv hvq| G c×wZtZ cŋg wP`Ti GKwU Abjfc Kwc Kti wZxqwu Dci i wL | hw` wP`T,tjv ci`uitK m×uYf`c AveZ Kti, Zte Giv meŋg| wP`T F_1 , wP`T F_2 Gi meŋg ntj Avgiv $F_1 \cong F_2$ Øviv cKvk Kwii |



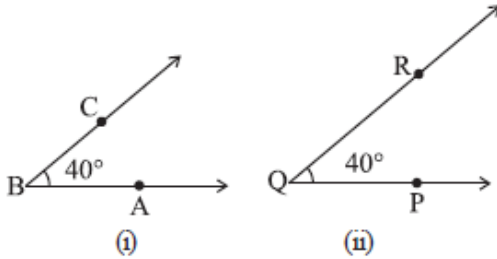
`BwU tiLvsk KLB meŋg nte? wP`T `B trvov tiLvsk AwKv ntqtQ| Dcwii cvZb c×wZtZ AB Gi Abjfc Kwc CD Gi Dci ti tL t`wL th, AB tiLvsk CD tiLvsktK tXtK w`tqtQ Ges A I B wex`yh_vutg

C და D წერტილები AB სეგმენტის შუალედში მდებარეობს. G და H წერტილები PQ სეგმენტის შუალედში მდებარეობს. $AC = PH$ და $BD = HQ$ და $AB = PQ$. AC და BD სეგმენტების სიგრძეები თანაბარია.



შეამოწმოთ, რომ $AC = PH$ და $BD = HQ$ და $AB = PQ$ და AC და BD სეგმენტების სიგრძეები თანაბარია.

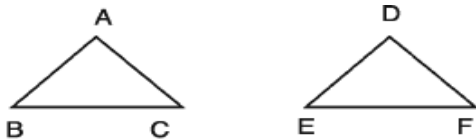
შეამოწმოთ, რომ $\angle ABC = \angle PQR$ და $AB = PQ$ და $AC = PH$ და $BD = HQ$ და $AB = PQ$ და AC და BD სეგმენტების სიგრძეები თანაბარია.



შეამოწმოთ, რომ $\angle ABC = \angle PQR$ და $AB = PQ$ და $AC = PH$ და $BD = HQ$ და $AB = PQ$ და AC და BD სეგმენტების სიგრძეები თანაბარია.

10.2 სამკუთხედების მსგავსება

გვეთვალოს, რომ $\triangle ABC$ და $\triangle DEF$ სამკუთხედები A, B, C და D, E, F კუთხოვანი წერტილები $\triangle ABC$ და $\triangle DEF$ სამკუთხედების შიგნით მდებარეობს.



$\triangle ABC$ და $\triangle DEF$ სამკუთხედები A, B, C და D, E, F კუთხოვანი წერტილები $\triangle ABC$ და $\triangle DEF$ სამკუთხედების შიგნით მდებარეობს.

$\angle A = \angle D, \angle B = \angle E, \angle C = \angle F$ და

$\triangle ABC$ და $\triangle DEF$ სამკუთხედები $\triangle ABC \cong \triangle DEF$ და

შეამოწმოთ, რომ $\triangle ABC$ და $\triangle DEF$ სამკუთხედები $\triangle ABC \cong \triangle DEF$ და

KvR :

1| $\triangle ABC$ GKwU wî fR AwK thb $AB = 5$ tm.wg., $BC = 6$ tm.wg. Ges $\angle B = 60^\circ$ nq|

(K) wî fRi ZZxq evûi ``N©Ges Ab`` tKvY `BwU cwi gvc Ki |

(L) tZvgvft` i cwi gvc ,tj v Zj bv Ki | Kx t` LtZ cv"Q?

Dccv`" 1 (evû-tKvY-evû Dccv`")

hw` `BwU wî fRi GKwU i `B evû h_vµtg AciwU i `B evûi mgvb nq Ges evû `BwU i Ašfj® tKvY `BwU ci `úi mgvb nq, Zte wî fR `BwU meŋg nq|

wetkl wbePb: gtb Kwî ,

$\triangle ABC \mid \triangle DEF$ G $AB = DE, AC = DF$

Ges Ašfj® $\angle BAC = \text{Ašfj® } \angle EDF$

cŋvY Ki tZ nte th, $\triangle ABC \cong \triangle DEF$

cŋvY :

avc

(1) $\triangle ABC$ tK $\triangle DEF$ Gi Dci Ggbfvte `vcb Kwî thb A we`y D we`j Dci | AB evû DE evû eivei Ges DE evûi th cvtk F Avtk C we`y Hcvtk cto| GLb $AB = DE$ etj B we`y Aek`B E we`j Dci cote|

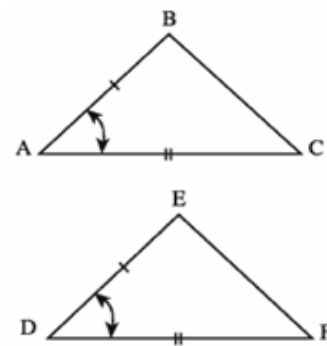
(2) thtnZl $\angle BAC = \angle EDF$ Ges AB evû DE evûi Dci cto, mZivs AC evû DF evû eivei cote|

(3) $AC = DF$ etj C we`y Aek`B F we`j Dci cote|

(4) GLb B we`y E we`j Dci Ges C we`y F we`j Dci cto etj BC evû Aek`B EF evûi mvtk cŋivcwi wgtj hvte|

AZGe, $\triangle ABC, \triangle DEF$ Gi Dci mgvcwZZ nte|

$\triangle ABC \cong \triangle DEF$ (cŋwYZ)



h_v_Zv

[evûi meŋgZv]

[tKvYi meŋgZv]

[evûi meŋgZv]

[`BwU we`j ga` w`tq GKwU gvÎ mij tî Lv A¼b Kiv hvq]

D`vniY 1| $\widehat{P\hat{I}}$, $AO = OB, CO = OD$.

côvY Ki th, $\triangle AOD \cong \triangle BOC$.

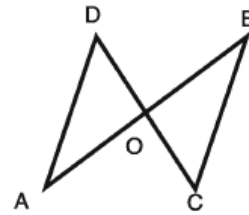
côvY : $\triangle AOD$ Ges $\triangle BOC$ G

$AO = OB, CO = OD$ † l qv AvtQ

Ges Zvt` i Ašfš $\angle AOD = \text{Ašfš } \angle BOC$

[wecZxc tKvY ci`úi mgvb]

$\therefore \triangle AOD \cong \triangle BOC$ [evû-tKvY-evû Dccv`"] (côvYZ)



Dccv`" 2

hw` tKvYbv $\widehat{f\hat{R}i}$ `Bw evû ci`úi mgvb nq, Zte Gt` i wecixZ tKvY `Bw ci`úi mgvb nte|

wekI wePb : gtb KwI, ABC $\widehat{f\hat{R}i}$ $AB = AC$ |

côvY Ki tZ nte th, $\angle ABC = \angle ACB$ |

A¼b : $\angle BAC$ Gi mgwLðK AD AwK thb Zv BC tK D

we` tZ tQ` Kti |

côvY : $\triangle ABD$ Ges $\triangle ACD$ G

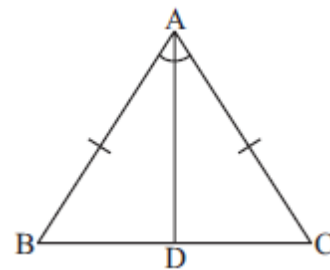
(1) $AB = AC$ (côE)

(2) AD mvaviY evû Ges

(3) Ašfš $\angle BAD = \text{Ašfš } \angle CAD$ (A¼bvbnviti)

mjZi vs, $\triangle ABD \cong \triangle ACD$ [evû-tKvY-evû Dccv`"]

$\therefore \angle ABD = \angle ACD$ A_ŕ, $\angle ABC = \angle ACB$ (côvYZ)



Abkxj bx 10.1

1| $\widehat{P\hat{I}}$, CD, AB Gi j mgwLðK ,

côvY Ki th $\triangle ADC \cong \triangle BDC$.

2| $\widehat{P\hat{I}}$, $CD = CB$ Ges $\angle DCA = \angle BCA$

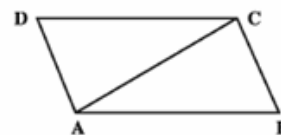
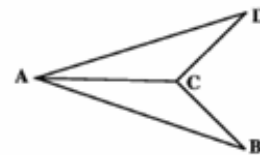
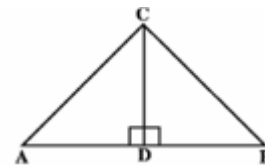
côvY Ki th, $AB = AD$

3| $\widehat{P\hat{I}}$, $\angle BAC = \angle ACD$ Ges $AB = DC$

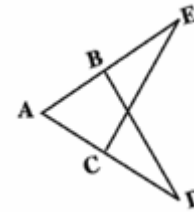
côvY Ki th, $AD = BC, \angle CAD = \angle ACB$

Ges $\angle ADC = \angle ABC$.

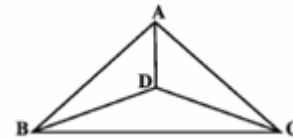
4| côvY Ki th, mgwEvû $\widehat{f\hat{R}i}$ fvgtK Dfqv`tK ewaZ Ki tJ Drcbæwnt` tKvY `Bw ci`úi mgvb|



- 5| $\widehat{P\hat{I}}$, $AD = AE, BD = CE$
 Ges $\angle AEC = \angle ADB$
 cõvY Ki th, $AB = AC$



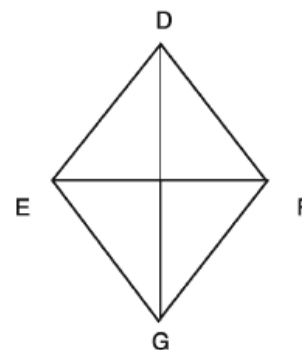
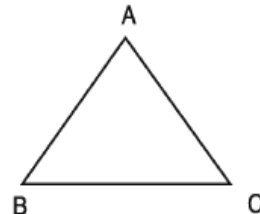
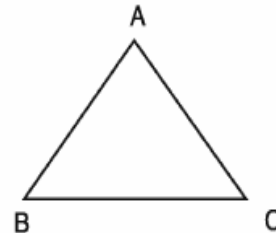
- 6| $\widehat{P\hat{I}}$, $\triangle ABC$ Ges $\triangle DBC$ `Bũ mgvøevũ wĩ fR|
 cõvY Ki th, $\triangle ABD = \triangle ACD$



- 7| cõvY Ki th, mgvøevũ wĩ fRi fũgi cõšw`yt_ĩK weciXZ evũĩtqi Dci AwZ ga`gvøq mgvb|
 8| cõvY Ki th, mgvøevũ wĩ fRi tKvY,tjv ci`úi mgvb|

Dccv` 3 (evũ-evũ-evũ Dccv`)

hw` GKũ wĩ fRi wZb evũ Aci GKũ wĩ fRi wZb evũi mgvb nq, Zte wĩ fR `Bũ meĩg nte|
 weĩkl wePb : gĩb Kwĩ, $\triangle ABC$ Ges $\triangle DEF$ G
 $AB = DE, AC = DF$ Ges $BC = EF$,
 cõvY Ki tZ nte th, $\triangle ABC \cong \triangle DEF$.



cõvY : gĩb Kwĩ, BC Ges EF evũ h_vµtg $\triangle ABC$ Ges $\triangle DEF$ Gi enĖg evũĩq|
 GLb $\triangle ABC$ tK $\triangle DEF$ Gi Dci Ggbfvte`vcb Kwĩ, thb
 B we`y E we`j Dci Ges BC evũ Gi mgvb EF evũ eivei
 Ges EF tiLvi th cvĩk D we`y AvtQ, A we`jK Gi weciXZ
 cvĩk`vcb Kwĩ | gĩb Kwĩ, G we`y A we`j bZb Ae`vb|
 thĩnZĩ $BC = EF$, C we`y F we`j Dci cote| mĩZivs
 $\triangle GEF$ nte $\triangle ABC$ Gi bZb Ae`vb|
 A_ĩ, $EG = BA, FG = CA$ | $\angle EGF = \angle BAC$.
 D,G thvM Kwĩ |

avc

h_v_Zv

(1) $\triangle EGD$ G $EG = ED$ [KviY $EG = BA = ED$] [Dccv`"-2]

AZGe, $\angle EDG = \angle EGD$

(2) $\triangle FGD$ G $FG = FD$ [Dccv`"-2]

AZGe, $\angle FDG = \angle FGD$.

(3) mZivs, $\angle EDG + \angle FDG = \angle EGD + \angle FGD$ [evû-tKvY-evû Dccv`"]

ev, $\angle EDF = \angle EGF$

A_ŕ, $\angle BAC = \angle EDF$

AZGe, $\triangle ABC$ l $\triangle DEF$ -G $AB = DE$, $AC = DF$ Ges

Ašfŕ $\angle BAC = \angle EDF$

$\therefore \triangle ABC \cong \triangle DEF$ (cŕgwyZ)|

Dccv`" 4 (tKvY-evû-tKvY Dccv`")

hw` GKwJ wî fŕRi `BwJ tKvY l tKvY msj Mæevû h_vµtg Aci GKwJ wî fŕRi `BwJ tKvY l tKvY msj Mæevûi mgvb nq, Zte wî fŕRi `BwJ meŕg nte|

weŕkl wePb: gtb Kwî,

$\triangle ABC$ l $\triangle DEF$ -G

$\angle B = \angle E$, $\angle C = \angle F$ Ges

tKvY msj MæBC evû = Abj c

EF evû|

cŕgY KiŕZ nte th,

$\triangle ABC \cong \triangle DEF$.

cŕgY :

avc

h_v_Zv

(1) $\triangle ABC$ tK $\triangle DEF$ Gi Dci Ggbfvte `vcb Kwî thb, B we`y [evûi meŕgZv]

E we`j Dci BC evû EF evû eivei Ges EF ti Lvi th cvŕk

D AvŕQ A we`ythb Hcvŕk cŕo|

thŕnZl $BC = EF$, AZGe C we`y F we`j Dci Aek`B coŕe|

(2) Avei, $\angle B = \angle E$ eŕj, BA evû DE evû eivei coŕe Ges [tKvŕYi meŕgZv]

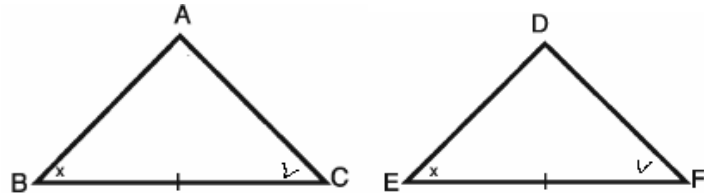
$\angle C = \angle F$ eŕj, CA evû FD evû eivei coŕe|

(3) $\therefore BA$ Ges CA evûi mvaviY we`y A , BD l FD evûi mvaviY

we`y D Gi Dci coŕe|

A_ŕ, $\triangle ABC$, $\triangle DEF$ Gi Dci mgvcwZZ nte|

$\therefore \triangle ABC \cong \triangle DEF$ (cŕgwyZ)



D`vniY 1| cõvY Ki th, tKv`bv wî fRi wkitKvYi mgwLðK hw` fngi Dci j`^nq, Zte wî fRw mgwðevù|

wetkl wbePb : wPîT, $\triangle ABC$ Gi wkitKvY A-Gi mgwLðK AD fng BC Gi D we>`fZ j`^f
cõvY Ki fZ nte th, $AB = AC$.

cõvY : $\triangle ABD$ Ges $\triangle ACD$ G

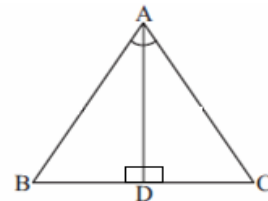
$\angle BAD = \angle CAD$ [$\because AD$, $\angle BAC$ Gi mgwLðK]

$\angle ADB = \angle ADC$ [$\because AD$, BC Gi Dci j`^f]

Ges AD mvaviY evù|

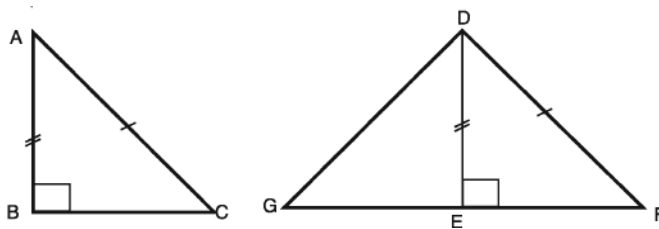
mZivs $\triangle ABD = \triangle ACD$ [Dccv`" 4]

GZGe, $AB = AC$ [cõvwYZ]



Dccv`" 5 (mgKvYx AwZfR-evù Dccv`")

`Bw mgKvYx wî fRi AwZfRðq mgvb ntj Ges GKwI GK evù AciwI Aci GK evù mgvb ntj ,
wî fRðq memg nte|



wetkl wbePb : gtb KwI, $ABC \parallel DEF$ mgKvYx wî fRðq

AwZfR $AC = \text{AwZfR } DF$ Ges $AB = DE$.

cõvY Ki fZ nte th, $\triangle ABC \cong \triangle DEF$

cŋvY :

avc

h_v_Zv

(1) $\triangle ABC$ tk $\triangle DEF$ Gi Dci Ggbfvte `vcb Kwi thb, B we`y E [evûi meŋgZv]

we`y Dci, BA evû ED evû eivei Ges C we`y ED Gi th cvtk

F we`y AvtQ Gi weciXZ cvtk cto |

awi, G we`y C we`y bZb Ae`vb | thtnZl $AB = DE$, A we`y D

we`y Dci coŋe | dtj $\triangle DEG$ nte $\triangle ABC$ Gi bZb Ae`vb |

mZivs, $DG = AC = DF$, $\angle DEG = \angle DEF = \angle ABC = GK$

mgtkvY Ges $\angle DGE = \angle ACB$ |

(2) thtnZl $\angle DEF + \angle DEG = 1$ mgtkvY + 1 mgtkvY = 2 mgtkvY,

$\therefore GEF$ GKwL mij ti Lv |

GLb, thtnZl $\triangle DGF$ - G $DG = DF$

$\therefore \angle DFG = \angle DGF$ ev $\angle DFE = \angle DGF$

mZivs $\angle DFE = \angle ACB$

[Dccv` 2]

(3) GLb, $\triangle ABC$ l $\triangle DEF$ -G

$\angle ABC = \angle DEF$ [\because cŋZ`tk GK mgtkvY]

$\angle ACB = \angle DFE$ Ges AB evû = Abj $\in DE$ evû |

mZivs, $\triangle ABC \cong \triangle DEF$ (cŋwvYZ)

[tkvY-evû-tkvY Dccv`]

Abkxj bx 10.2

1 | $\triangle ABC$ G $AB = AC$ Ges O , ABC Gi Af`šti Ggb GKwL we`ythb $OB = OC$ ev

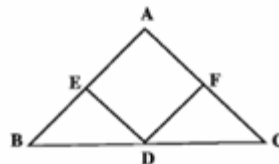
cŋvY Ki th, $\angle AOB = \angle AOC$.

2 | $\triangle ABC$ Gi AB l AC evûtZ h_vµtg D l E Ggb `BwL we`ythb $BD = CE$ Ges

$BE = CD$. cŋvY Ki th, $\angle ABC = \angle ACB$.

3 | wpti, $\triangle ABC$ -G $AB = AC$, $BD = DC$

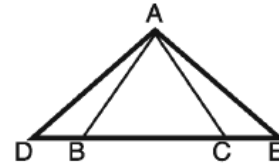
Ges $BE = CF$ | cŋvY Ki th, $\angle EDB = \angle FDC$



4| $\widehat{P\hat{T}}$, $\triangle ABC$ -G $AB = AC$ Ges

$\angle BAD = \angle CAE$ | cōvY Ki th,

$AD = AE$



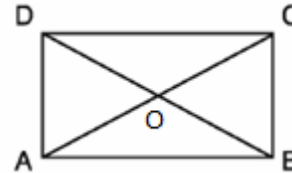
5| $ABCD$ PZfR AC , $\angle BAD$ Ges $\angle BCD$ Gi mgvLDK | cōvY Ki th, $\angle B = \angle D$.

6| $\widehat{P\hat{T}}$, $ABCD$ PZfRi AB Ges

CD ci-úi mgvb | mgvŠt-vj Ges

$AC \perp BD$ KY[©] Bw O we[˘] tZ tQ[˘] Kti tQ |

cōvY Ki th, $AD = BC$.



7| cōvY Ki th, mgvDevū $\widehat{P\hat{T}}$ fRi fRi cōš-we[˘] q t_˘K wecixZ evūi Dci Aw₄Z j[˘] q ci-úi mgvb |

8| cōvY Ki th, tKv_˘ $\widehat{P\hat{T}}$ fRi fRi cōš-we[˘] q t_˘K wecixZ evūi Dci Aw₄Z j[˘] q hw[˘] mgvb nq, Zte $\widehat{P\hat{T}}$ fRiU mgvDevū |

9| $ABCD$ PZfRi $AB = AD$ Ges $\angle B = \angle D = GK$ mg_˘KvY |

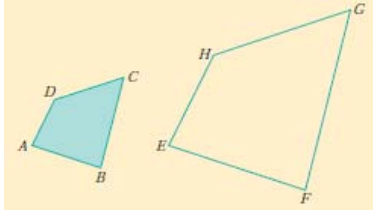
cōvY Ki th, $\triangle ABC \cong \triangle ADC$.

10.3 m[˘] kZv

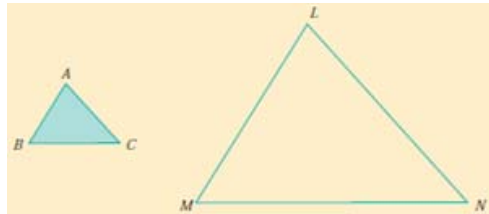
wb_˘Pi $\widehat{P\hat{T}}$ t_˘j v GKB $\widehat{P\hat{T}}$ i tQvU-eo AvKvi | G_˘ i wevfbwAstki AvKvi GKB, wKŠ[˘] Abje[˘] j[˘] tZ_˘ mgvb bq | $\widehat{P\hat{T}}$ t_˘j v_˘K m[˘] k $\widehat{P\hat{T}}$ ej v nq |



KvR :

1| (K) $\hat{P}T$ i PZFR $\hat{B}U$ K m`k etj gtb nq?

tKy		evu	
A	E	AB =	EF =
B	F	BC =	FG =
C	G	CA =	GH =
D	H	AD =	EH =

(L) $\hat{P}T$ $\hat{B}U$ i tKy, tj v tgtc mviwYU ciY Ki | tKy, tj vi gta" tKvfbv muK^oAvtQ K ?(M) $\hat{P}T$ $\hat{B}U$ i Abje evu, tj v tgtc mviwYU ciY Ki | evu, tj vi gta" tKvfbv muK^oAvtQ K ?2| ABC \hat{w} fRtK LMN evaZ Kti \hat{w} fRuU AvKv ntqtQ|(K) Abje tKy, tj v \hat{w} t`R Ki Ges cwi gvc Ki |(L) Abje evu, tj v \hat{w} t`R Ki Ges cwi gvc Kti AbjevZ tei Ki | AbjevZ, tj v K mgvb ?

m`k $\hat{P}T$ GKB AvKvZi KŠ' AvKvti mgvb bvl ntZ cvti | m`k $\hat{P}T$ i AvKvi mgvb ntj Zv mefg $\hat{P}T$ cwiYZ nq| mZivs mefgZv m`kZvi wetkl i e|

 $\hat{B}U$ \hat{w} fR ev eufR m`k ntj

- Abje tKy, tj v mgvb |
- Abje evu, tj v mgvb cwiZK |

m`k $\hat{P}T$ i evu, tj vi AbjevZ \hat{w} iv gj $\hat{P}T$ i Zj bq Ab" $\hat{P}T$ i ea^o A_ev m^{1/4}vPb tevSvq|

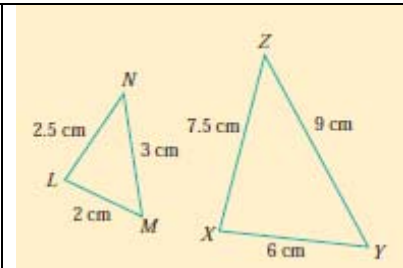
10.4 m`k wî fR

`Bw m`k wî fRi Abje tKvY,tj v mgvb Ges Abje evù,tj v mgvbcwZK | `Bw wî fR m`k nI qvi Rb`
b-bZg kZteI Kw |

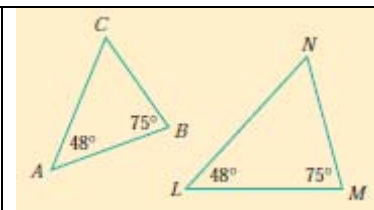
KvR :

1 | wZb-Pi Rtbi `j MVb Kti wbtPi KvR,tj v Ki :

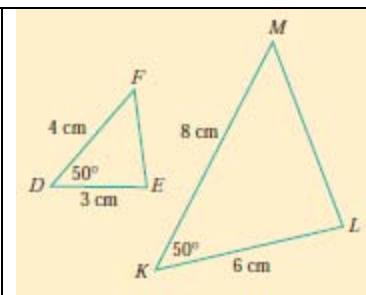
- 1 | (K) $\triangle LMN$ wî fRw AwK, hvi $LM = 2$ tm.wg., $MN = 3$ tm.wg., $LN = 2.5$ tm.wg. | G wî fRw wK Abb`?
(L) $\triangle XYZ$ wî fRw AwK, hvi $XY = 6$ tm.wg., $YZ = 9$ tm.wg., $XZ = 7.5$ tm.wg. |
(M) $\triangle LMN$ I $\triangle XYZ$ wî fRi Abje evù,tj vi AbjvZ mgvb wK ?
(N) $\triangle LMN$ I $\triangle XYZ$ m`k wK?



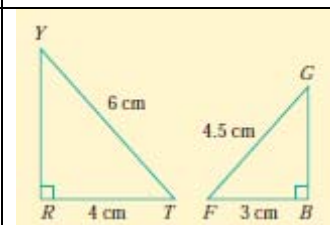
- 2 | (K) $\triangle ABC$ wî fRw AwK, hvi $\angle A = 48^\circ$, $\angle B = 75^\circ$.
(L) Gevi $\triangle LMN$ wî fRw AwK, hvi $\angle L = 48^\circ$, $\angle M = 75^\circ$.
(M) $\triangle ABC$ I $\triangle LMN$ m`k wK? tKb?
(N) tZvgvi AwKv wî fR,tj v Ab` wkv`v` i AwKv wî fR,tj vi mv`
Zj bv Ki | tm,tj v wK m`k?



- 3 | (K) $\triangle DEF$ wî fRw AwK, hvi $DE = 3$ tm.wg., $DF = 4$ tm.wg. I AšfP tKvY $\angle D = 50^\circ$.
(L) $\triangle KLM$ wî fRw AwK, hvi $KL = 6$ tm.wg., $KM = 8$ tm.wg. I AšfP tKvY $\angle K = 50^\circ$.
(M) $\triangle DEF$ I $\triangle KLM$ wî fRi Abje evù,tj v wK mgvbcwZK ?
(N) $\triangle DEF$ I $\triangle KLM$ m`k wK? e`vL`v Ki |



- 4 | (K) $\triangle RTY$ wî fRw AwK, hvi $RT = 4$ tm.wg., $\angle R = 90^\circ$ I AwZfR $TY = 6$ tm.wg. |
(L) (K) $\triangle BFG$ wî fRw AwK, hvi $BF = 3$ tm.wg., $\angle B = 90^\circ$ I AwZfR $FG = 4.5$ tm.wg. |
(M) $\triangle RTY$ I $\triangle BFG$ wî fRi Abje evù,tj vi AbjvZ teI Ki |
Ziv mgvb wK ?
(N) $\triangle LMN$ I $\triangle XYZ$ m`k wK?

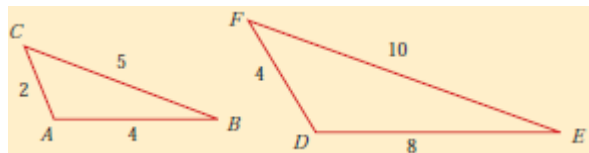


10.5 წიგნის მკვრივ კვლევა

დღეს ამჯერადვე ჩვენს წიგნის მკვრივ კვლევაში ჩვენი მიზანია:

კვლევა (ერთ-ერთ-ერთ)

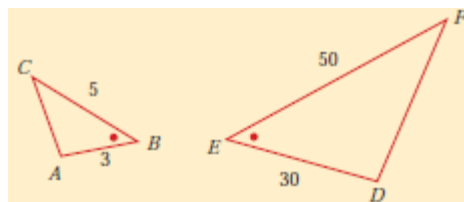
ჩვენ გვინდა წიგნის მკვრივ ერთი გვერდის ნაგებობა, ზედა წიგნის მკვრივ



კვლევა (ერთ-ერთ-ერთ)

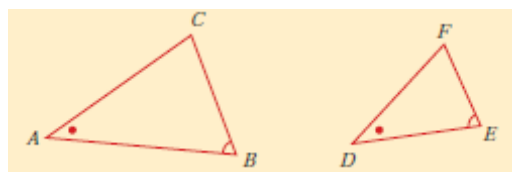
ჩვენ გვინდა წიგნის მკვრივ ერთი გვერდის ნაგებობა, ზედა წიგნის მკვრივ

მკვრივ ერთი გვერდის ნაგებობა, ზედა წიგნის მკვრივ



კვლევა (ერთ-ერთ-ერთ)

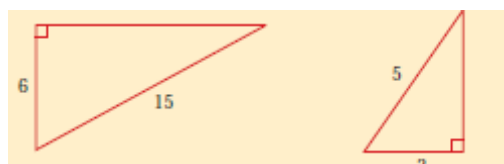
ჩვენ გვინდა წიგნის მკვრივ ერთი გვერდის ნაგებობა, ზედა წიგნის მკვრივ



კვლევა (ერთ-ერთ-ერთ)

ჩვენ გვინდა წიგნის მკვრივ ერთი გვერდის ნაგებობა, ზედა წიგნის მკვრივ

მკვრივ ერთი გვერდის ნაგებობა, ზედა წიგნის მკვრივ



10.6 m`k PZfR

`Bw m`k PZfRi Abje tKvY,tjv mgvb Ges Abje evũ,tjv mgvbcwZK | `Bw PZfR m`k nI qvi kZqbyQ Kwi |

KvR :

wZb-Pvi Rtbi `j MVb Kti wbtPi KvR,tjv Ki :

1 | (K) $KLMN$ PZfRw AwK, hvi $\angle K = 45^\circ$, $KL = 3$ tm.wg., $LM = 2$ tm.wg., $MN = 3$ tm.wg., $NK = 2.5$ tm.wg. |

[BwZ ; cŁtg $\angle K$ tKvYw AwK Ges tKvYi evũ `Bw tŁK KL | LM mgvb `ŁZj `Bw wex`y wPyZ Ki | AZtci Aci `B evũ AwK |]

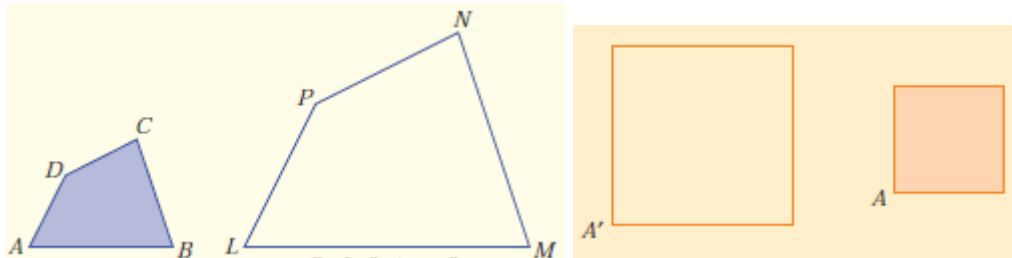
(L) $WXYZ$ PZfRw AwK, hvi $WX = 8$ tm.wg., $XY = 4$ tm.wg., $YZ = 6$ tm.wg., $ZX = 5$ tm.wg., $\angle L = 45^\circ$. G PZfRw wK Abb?

(M) $KLMN$ | $WXYZ$ PZfRi Abje evũ,tjvi AbcvZ mgvb wK?

(N) $KLMN$ | $WXYZ$ PZfRi Abje tKvY,tjv cwigvc Ki | tm,tjv wK ci`ui mgvb ?

(N) $KLMN$ | $WXYZ$ m`k wK?

2 | tZvgvi cŁ`gtZv tKvY | evũ wbtq wbtPi KvRw cŁivq Ki | PZfR,tjv m`k wK?



`Bw PZfRi Abje evũ,tjv mgvbcwZK ntj PZfR `Bw m`k |

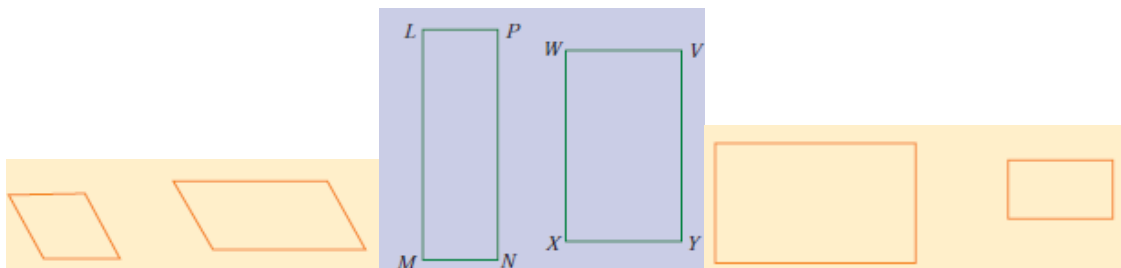
j Yxq th, `Bw m`k PZfRi

(K) Abje tKvY,tjv mgvb Ges

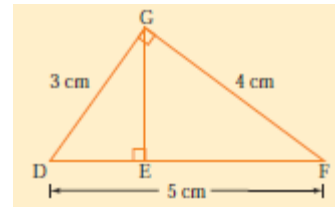
(L) Abje evũ,tjv mgvbcwZK |

KvR :

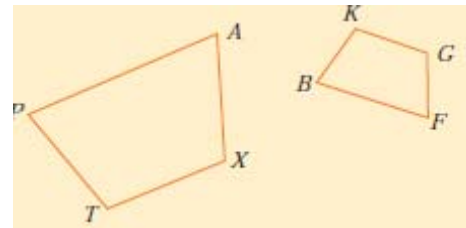
1 | wbtPi wPŁ,tjvi m`k tRvo wPyZ Ki | tZvgvi DŁti i cŁŁ hy³ `vI |



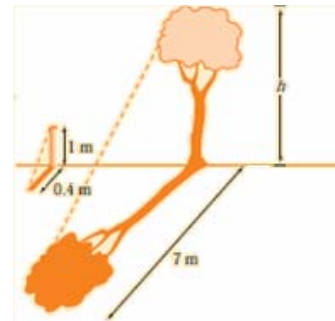
6| cōvY Ki th, wPŧî i wî fR wZbW m`k|



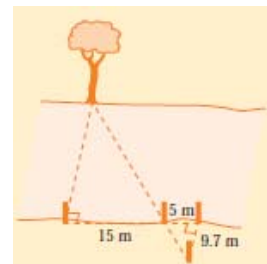
7| PZfR `Bŭi Abje tKvY I Abje evŭ,tj v
wPŭyZ Ki | PZfR `Bŭ m`k wK-bv hvPvB Ki |



8| 1 wglvi `Nŉ GKŭ j wV gwUŧZ `ŉvqgvb Ae`vq
0.4 wglvi Qvqv tdtj | GKŭ Lrov MvŧQi Qvqvi `Nŉ
7 wglvi ntj MvQŭi D`PZv KZ ?



9| wknve b`x cvi bv ntq b`xi cŉ' gvcŧZ Pvq | G
Rb` tm wK Aci cvŧo GKŭ MvQ tetQ wbtq b`xi
cvŧo wPŧî i b`vq wKQz gvcŧRvK Ki j | b`xi cŉ' wbyŉ
Ki |



GKv`k Aa`vq Z_` I DcvE

cŭPxbKvj t_`tKB tKv`bv wbw`Ń Df`tk` ev`e Rxe`bi A`bK NUbv ev Z_`vej MvYwZK msL`vi gva`tg cKvk Kiv n`Zv| eZg`vb `b b`b Rxe`bi wef`bœNUbv ev Z_`mg`n msL`vi gva`tg cKv`tki e`vcKZv ew`x t`c`q`q`Q| Avi msL`vevPK Z_`mg`n n`Q cwi msL`vb| `b b`b Rxe`b e`eüZ wef`bœcwi msL`vb mnR`eva` I AvKl`Yxq Kivi Rb` Zv wef`bœai`bi tj LwP`f`i m`v`v`h` Dc`vcb Kiv nq| Avi Gme tj LwP`f` t`tL Dc`w`cZ NUbv m`f`Ü Avgiv m`y`ú`o` avi Yv c`vB I eS`tZ cwi| G Aa`v`q Avgiv Z_` I DcvEi AvqZ`tj L m`f`Ü Rvbe| ZvQ`vov Aweb`-DcvE web`-Kivi Rb` tk`Y e`eav`bi gva`tg Kx`fv`te MYmsL`v mvi`wY MVb Kiv nq Zv Rvbe| cwi msL`v`bi GB w`el`q`_`tj`v` wk`v`v`_`f`i `b b`b Rxe`b e`vcK e`eüZ nq weav`q G m`f`Ü Zv`f`i cwi`v`i Ávb`_`vKv Acwi`nv`h`

Aa`vq t`k`f`l` wk`v`v`_`f`i v` -

- MYmsL`v mvi`wY Kx Zv e`vL`v Ki`tZ cvi`te|
- tk`Y e`eav`bi gva`tg Aweb`-DcvE web`-AvKv`ti cKvk Ki`tZ cvi`te|
- AvqZ`tj L A`b Ki`tZ cvi`te|
- Aw`4Z AvqZ`tj L n`tZ c`b`i K`fei Ki`tZ cvi`te|
- Aw`4Z AvqZ`tj L n`tZ DcvE m`f`ÜK`e`vL`v Ki`tZ cvi`te|

11.1 Z_` I DcvE

I ô tk`Y`tZ Avgiv Z_` I DcvE m`f`Ü tR`b`w`Q| msL`w`f`w`E`K tKv`bv Z_` ev NUbv n`Q GKwJ cwi msL`vb| Avi Z_` ev NUbv w`b`f`RK msL`v`_`tj`v` n`Q cwi msL`v`bi DcvE| aiv hvK, tKv`bv GK cix`v`v`q m`Bg tk`Y`tZ Aa`qbi Z 35 Rb wk`v`v`_`f`i MvY`tZ c`b` b`f` n`tj`v` -

80, 60, 65, 75, 80, 60, 60, 90, 95, 70, 100, 95, 85, 60, 85, 85, 90, 98, 85, 55, 50, 95, 90, 90, 98, 65, 70, 70, 75, 85, 95, 75, 65, 75, 65|

GLv`b, msL`v Ńviv w`b`f`RK b`f`mg`n H cix`v`i GKwJ cwi msL`vb| msL`v Ńviv w`b`f`RK b`f`_`tj`v` n`tj`v` cwi msL`v`bi DcvE| Zvntj Avgiv ej`tZ cwi, cwi msL`v`bi DcvEmg`n msL`vi gva`tg Dc`vcb Ki`tZ nq| Z`te tKv`bv wef`QbœmsL`v`tK cwi msL`vb ej`v` nq bv| thgb, GKRB Qv`f`i c`b` b`f` 85 ej`v` n`tj`v` Zv cwi msL`vb n`te bv|

11.2 cwi msL'vb DcvĖ

cwi msL'vb DcvĖ `ß ai tbi | h_v,

(1) cĕwgK DcvĖ ev cĕwĕ DcvĖ | (2) gva'wgK DcvĖ ev cĕivĕ DcvĖ |

(1) cĕwgK DcvĖ : cĕeewYz tKvĕbv GK cixĕvq MwYz cĕß baf_tjv cĕwgK DcvĖ | Giε DcvĖ cĕqvRb Abĕvqx AbmÜvbKvix mivmwi Drm t_tK msMĕ Ki tZ cvti | mZivs Drm t_tK mivmwi th DcvĖ msMpxZ nq ZvB ntjv cĕwgK DcvĖ | mivmwi msMpxZ weavq cĕwgK DcvĖi wbfPthvM'Zv A t bK teuk |

(2) gva'wgK DcvĖ : cĕexi K t qKw knti i tKvĕbv GK gvtmi Zvcgvĭv Avgvĕ i cĕqvRb | thfvte MwYz i cĕß baf_tjv Avgiv msMĕ KtiwQ t mfvte Zvcgvĭv Z_ Avgvĕ i cĕĕ msMĕ Kiv mae bq | G t ĕ t t tKvĕbv cĕZövtbi msMpxZ DcvĖ Avgiv Avgvĕ i cĕqvRb e'envi Ki tZ cwi | mZivs GLvĕb Drm nt'Q cĕivĕ | cĕivĕ Drm t_tK msMpxZ DcvĖ nt'Q gva'wgK DcvĖ | AbmÜvbKvix th t nZv b t Ri cĕqvRb Abĕvqx mivmwi DcvĖ msMĕ Ki tZ cvti bv t m t nZv i w b K U Gfvte msMpxZ DcvĖi wbfPthvM'Zv A t bK Kg |

11.3 Aweb''-I web''-DcvĖ

Aweb''-DcvĖ : cĕeewYz wĕvĕ i MwYz cĕß baf_tjv ntjv Aweb''-DcvĖ | GLvĕb baf_tjv G t j v t g t j v f v t e A v t Q | baf_tjv gvtbi tKvĕbv µtg mivRvĕbv t b B |

web''-DcvĖ : Dcti ewYz baf_tjv gvtbi Eaĕĕg Abmvti mivRvĕj Avgiv cvB, 50, 55, 60, 60, 60, 60, 65, 65, 65, 65, 70, 70, 70, 75, 75, 75, 75, 80, 80, 85, 85, 85, 85, 85, 90, 90, 90, 90, 95, 95, 95, 95, 98, 98, 100 |

Gfvte mivRvĕbv DcvĖmgn t K web''-DcvĖ etj | DcvĖmgn Avti v m n Rfvte mivwYfß Kti web''-Kiv hvq hv w b t P t ĕ L v t b v n t j v |

Aweb''-DcvĖ t K web''-Kivi m n R w b q g :

Dcti ewYz cĕß meĕgē baf 50 Ges mtePP baf 100 | GLb t k w w e b ' v m Kivi Rb 50 Gi Kg m e a v R b K t h t K v t b v G K w m s L ' v a i v h v q | m Z i v s A v g i v h w 46 t _ t K i i y K t i c ĕ Z 5 b a t i i e ' e a v t b i R b ' G K w t k w M V b K w i Z v n t j K q w t k w n t e Z v w a f Y K i t Z c w i | D t j Ø L , D c v t Ė i m s L ' v i D c i w f v Ė K t i m e a v R b K e ' e a v b w t q K Z K _ t j v t k w t Z f v M K i v n q | t k w t Z f v M K i v i w a f i Z t K v t b v w b q g t b B | Z t e m P r i P i c ĕ Z ' K t k w i e ' e a v b e v e w b i m e b a 5 I m t e P P 15 G i g t a ' m x g v e x i v L v n q | m s L ' v t k w w a f t Y i R b ' D c v t Ė i c w i m i w b Y q K i t Z n q |

$$cwi mi = (mtePP msL\ddot{v} - me\textcircled{b}msL\ddot{v}) + 1$$

$$GLv\textcircled{b} tk\textcircled{Y}e\textcircled{w}\beta 5 Gi Rb\textcircled{v} Avtj vP\textcircled{v} Dcv\textcircled{E}i tk\textcircled{Y}msL\ddot{v} = \frac{(mtePP msL\ddot{v} - me\textcircled{b}msL\ddot{v}) + 1}{5}$$

$$= \frac{(100 - 50) + 1}{5} \text{ ev } \frac{51}{5} = 10.2 = 11|$$

mZivs 46 t_tK Avi\textcircled{v}Kti c\textcircled{Z} 5 b\textcircled{v}ti i Rb\textcircled{v} e\textcircled{v}av\textcircled{b}i tk\textcircled{Y} ^Zwi Kitj tk\textcircled{Y}msL\ddot{v} nte 11w| c\textcircled{U}tg evgcvtK GKw Kj vtg b\textcircled{v}mg\textcircled{v}ni tk\textcircled{Y} _tj v tj Lv nte| Gici c\textcircled{B} b\textcircled{v}t _tj v GtK GtK vetePbv Kwi Ges c\textcircled{U}g b\textcircled{v}t th tk\textcircled{Y}tZ cote Zvi Rb\textcircled{v} H tk\textcircled{Y}i Wt\textcircled{b} Avi GKw Kj vtg U\textcircled{w}j (Tally) wPy \textcircled{0}|\textcircled{0} w\textcircled{v} B| tKv\textcircled{b}v tk\textcircled{Y}tZ hw\textcircled{v} Pv\textcircled{v}i i tenk U\textcircled{w}j wPy cto Zte c\textcircled{A}g U\textcircled{w}j wPyw PviwU wPy Rto AvovAmofvte w\textcircled{v}tZ nte| Gfvte tk\textcircled{Y}web\textcircled{v}m tkl ntj U\textcircled{w}j wPy MYbv Kti tk\textcircled{Y} Abjvqx b\textcircled{v}t c\textcircled{B} wk\textcircled{Y}v_\textcircled{v} msL\ddot{v} wba\textcircled{v}Y Kiv nq| tKv\textcircled{b}v tk\textcircled{Y}tZ hZRb Qv\textcircled{v} A\textcircled{v}f\textcircled{v} nte ZvB nte H tk\textcircled{Y}i NUbmsL\ddot{v} ev MYmsL\ddot{v}| MYmsL\ddot{v} msewj Z mviwY nte MYmsL\ddot{v} mviwY| Dc\textcircled{v}i i Avtj vPbvq ewY\textcircled{v} Dcv\textcircled{E}i web\textcircled{v} -mviwY w\textcircled{b}P t\textcircled{v} lqv ntj v :

b\textcircled{v}ti i tk\textcircled{Y} (tk\textcircled{Y} e\textcircled{v}av\textcircled{b}/e\textcircled{w}\beta = 5)	U\textcircled{w}j wPy	MYmsL\ddot{v} ev NUbmsL\ddot{v} (wk\textcircled{Y}v_\textcircled{v} msL\ddot{v})
46 – 50	I	1
51 – 55	I	1
56 – 60	IIII	4
61 – 65	IIII	4
66 – 70	III	3
71 – 75	IIII	4
76 – 80	II	2
81 – 85	IIII	5
86 – 90	IIII	4
91 – 95	IIII	4
96 – 100	III	3
tgvU		35

j\textcircled{Y} Kwi : GLv\textcircled{b} tk\textcircled{Y} e\textcircled{v}av\textcircled{b} ev e\textcircled{w}\beta aiv ntq\textcircled{0} 5| c\textcircled{U}qvRt\textcircled{b} Ges DcvĖ web\textcircled{v}tmi mjeavi Rb\textcircled{v} tk\textcircled{Y} e\textcircled{v}av\textcircled{b} th\textcircled{v}Kv\textcircled{b}v msL\ddot{v} aiv th\textcircled{v}Z cvti| Zte wnmv\textcircled{v}ei mjeav\textcircled{v}_\textcircled{v}tk\textcircled{Y} e\textcircled{v}av\textcircled{b} 5 t_tK 15 Gi g\textcircled{v}a\textcircled{v} mxgve\textcircled{x} ivLv nq|

D`vniY 1| tKvfbv kn̄ti i Rvbyvwi gv̄tmi 31 w̄ t̄bi Zvcgv̄t̄v (w̄w̄M̄t̄mj w̄mqv̄m) w̄b̄t̄P t̄` l qv n̄t̄j v| MYmsL̄v mviw̄Y `Zwi Ki (Zvcgv̄t̄v t̄j v cYmsL̄vq)|

20, 18, 14, 21, 11, 14, 12, 10, 15, 18, 12, 14, 16, 15, 12, 14, 18, 20, 22, 9, 11, 10, 14, 12, 18, 20, 22, 14, 25, 20, 10|

mgvavb : GLv̄t̄b Zvcgv̄t̄vi mēt̄oḡmsL̄vgv̄b 9 Ges m̄t̄ēP̄P msL̄vgv̄b 25| m̄Z̄i vs c̄0 Ē Dcv̄t̄Ēi cwi mi =
(25 – 9) + 1 = 17| m̄Z̄i vs 5 w̄w̄M̄t̄mj w̄mqv̄m Gi Rb̄ t̄k̄YmsL̄v $\frac{17}{5} = 3 \cdot 4$

∴ t̄k̄YmsL̄v n̄t̄e 4|

c̄0 Ē Dcv̄t̄Ēi MYmsL̄v mviw̄Y n̄t̄j v :

Zvcgv̄t̄vi t̄k̄Y	Ūw̄j w̄P̄Y	MYmsL̄v
9 – 13	𐌲𐌴 𐌲𐌴	10
14 – 18	𐌲𐌴 𐌲𐌴 III	13
19 – 23	𐌲𐌴 II	7
24 – 28	I	1
tgv̄U		31

KvR : 1| t̄Zvgv̄t̄` i t̄k̄Yi 30 Rb K̄ti w̄k̄Yv̄P̄w̄b̄t̄q GK GK̄U `j Mv̄b Ki | c̄0Z̄`K `t̄j i m̄`m̄MY w̄b̄t̄R w̄bR
`t̄j i m̄`m̄t̄` i D̄`PZv (t̄m̄w̄UgUv̄t̄i) cwi gvc Ki | c̄0B̄ Dcv̄t̄Ēi MYmsL̄v mviw̄Y `Zwi Ki |

11.4 MYmsL̄v AvqZ̄t̄j L

t̄Kvfbv cwi msL̄vb hLb t̄j Lw̄P̄t̄Ēi gvāt̄g Dc̄`vc̄b Kiv nq ZLb Zv tevSv l w̄m̄x̄v̄S̄-t̄bl qvi Rb̄ thgb mnR nq t̄Zgv̄b w̄P̄ĒvK̄ĪK̄ nq| GB t̄c̄0̄v̄c̄t̄U cwi msL̄v̄t̄b t̄j Lw̄P̄t̄Ēi gvāt̄g MYmsL̄v mviw̄Y Dc̄`vc̄b eūj c̄P̄j Z c̄x̄w̄Z| Avi AvqZ̄t̄j L ev MYmsL̄v AvqZ̄t̄j L n̄t̄`Q MYmsL̄v mviw̄Yi GK̄U t̄j Lw̄P̄t̄Ēi | MYmsL̄v AvqZ̄t̄j L AuK̄vi Rb̄ w̄b̄t̄Pi avc̄ t̄j v Ab̄yniY Kiv nq :

- 1| GK̄U MYmsL̄v mviw̄Yi t̄k̄Y ēw̄B̄ x-ĀȲ eivei t̄j Lv nq Ges t̄k̄Y ēw̄B̄ f̄w̄g āt̄i AvqZ̄ AuK̄v nq| m̄jeavRbK̄ t̄`t̄j t̄k̄Y ēw̄B̄ t̄bl qv nq|
- 2| m̄jeavRbK̄ t̄`t̄j y-ĀȲ eivei MYmsL̄vi gvb t̄bl qv nq Ges MYmsL̄v nq Avq̄t̄Zi D̄`PZv| Df̄q Āt̄Ȳi Rb̄ GKB ev c̄w̄K̄ m̄jeavRbK̄ t̄`t̄j t̄bl qv hv̄q|

D`vniY 2| tZvgv`i i`fj i 10g tkYi 60 Rb wkYv_ſ I Rſbi (AvmbæKtj vMſg) MYmsL`v mviwY wbſP
t`I qv ntjv| MYmsL`v mviwY t`tK DcvEi AvqZtj L AwK Ges AvqZtj L t`tL cſi K (Avmbægvb) wbYſ
Ki |

tkY e`wB	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65
MYmsL`v	8	15	25	10	2

mgvavb : x-Aſ | y-Aſ eivei QK KvMſRi (Graph Paper) ſi Zg eſMP cſZ NiſK tkY e`wBi GK
GKK Ges y-Aſ eivei QK KvMſRi cſZ 2 NiſK MYmsL`vi 5 GKK aſi MYmsL`v AvqZtj L AwKv
ntqtQ| x-Aſ eivei tkY e`wB Ges y-Aſ eivei MYmsL`v aiv ntqtQ| thſnZi tkY e`wB x-Aſ eivei
41 t`tK Avi æKiv ntqtQ, tmſnZi x-Aſſi gj we`yt`tK 41 chſ-fvOv wPy w`tq tevſſbv ntqtQ th,
ewK Ni ſtj v we`gvb AvſQ|

ſPſ

Dctii AvqZtj L t`tK cſZxqgvb nq th, MYmsL`vi cſPh⁵⁰⁻⁵⁵ tkYtZ| mZivs cſi K GB tkYtZ
we`gvb| cſi K wbaſY Kivi Rb` AvqZi Dcwi fvM tKſYK we`yt`tK `Bw AvovAwv tiLvsk AvſMi I
ctii AvqZi Dcwi fvſMi tKſYK we`ymvſ_ mſthvM Kiv nq| Gſi tQ` we`yt`tK mſwK-fvſgi Dci j æ^
Uvbn nq| j æ^x-Aſſi thLvſb wſw Z nq Gi e`wB wbaſY Kiv nq| wbaſi Z e`wB ntjv cſi K| ſPſ t`tK
t`Lv hvq 52 DcvEi cſi K|

wbſYſ cſi K 52 tKwR|

D`vniY 3| tKvſbv we`vj ſqi 10g tkYtZ Aa`qbi Z 125 Rb wkYv_ſ MwYZ weſtq cſB bæſi i MYmsL`v
weſkH (Frequency Distribution) mviwY wbſP t`I qv ntjv| GKw AvqZtj L AwK Ges AvqZtj L t`tK
cſi K (Avmbæ wbYſ Ki |

tkY e`wB	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
wkYv_ſ msL`v (MYmsL`v)	5	12	30	40	20	13	3	2

mgvavb : cŭtg QK KwM†R x-A¶ | y-A¶ AwKv ntqtQ, y-A¶ eivei wk¶v_¶ msL˘v (MYmsL˘v) Ges x-A¶ eivei tkŭYe˘mß a†i AvqZ†j LuU AwKv ntqtQ | GLv†b x | y Dfq A†¶ QK KwM†Ri GK Ni mgvb 2 GKK aiv ntqtQ | x-A†¶ 0 t_†K 20 chS-Av†Q tevS†Z fvOv wPy t˘ l qv ntqtQ |

wP†

GLv†b wP†wqZ AvqZ†j L t_†K t˘ Lv hvq, tewk msL˘K wk¶v_¶ cŭß b†† 50 t_†K 60 Gi g†a˘ Ges tQ˘ we˘yt_†K x A†¶i Dci th j †Uvbn ntqtQ Gi e˘mß 50 l 60 Gi ga˘we˘y | ZvB wk¶v_¶ i cŭß b††i i cŭß K ntj v 55 |

KvR : 1 | tZvgv˘ i tkŭ†Z Aa˘qbiZ wk¶v_¶ i w†q ˘ßw ˘j MvB Ki | ˘†j i bvg ˘vl | thgb, kvcj v l i RbxMŬv | tKv†bv †gwmK/Aa˘wK cix¶vq (K) kvcj v ˘†j i evsjvq cŭß b††i MYmsL˘v mviwY ˘Zwi K†i AvqZ†j L AwK | (L) i RbxMŬv ˘†j i B†i w†Z cŭß b††i MYmsL˘v mviwY ˘Zwi K†i AvqZ†j L AwK |

Abkxj bx 11

- 1 | DcvĖ ej †Z Kx tevSvq Zv D˘vni†Yi gva˘tg wj L |
- 2 | DcvĖ KZ cŭK†i i? cŭZ˘K cŭK†i i DcvĖ Kxfvte msMŉ Kiv nq Ges cŭZ˘K cŭK†i DcvĖ msMŉni mjeav l Amjeav wj L |
- 3 | Aweb˘˘-DcvĖ Kx? D˘vniY ˘vl |
- 4 | GKwU Aweb˘˘-DcvĖ wj L | gv†bi µgvb†m†i m†w††q web˘˘-DcvĖ i fcvš† Ki |
- 5 | tKv†bv tkŭYi 60 Rb wk¶v_¶ MwYz wel†q cŭß b†† w†P t˘ l qv ntj v | MYmsL˘v mviwY ˘Zwi Ki |
50, 84, 73, 56, 97, 90, 82, 83, 41, 92, 42, 55, 62, 63, 96, 41, 71, 77, 78, 22, 48,
46, 33, 44, 61, 66, 62, 63, 64, 53, 60, 50, 72, 67, 99, 83, 85, 68, 69, 45, 22, 22,
27, 31, 67, 65, 64, 64, 88, 63, 47, 58, 59, 60, 72, 71, 73, 49, 75, 64 |
- 6 | w†P 50wU t˘ vKv†bi gwmK we††qi cwi gvY (nvRvi UvKvq) t˘ l qv ntj v | 5 tkŭYe˘mß a†i MYmsL˘v mviwY ˘Zwi Ki |
132, 140, 130, 140, 150, 133, 149, 141, 138, 162, 158, 162, 140, 150, 144, 136,
147, 146, 150, 143, 148, 150, 160, 140, 146, 159, 143, 145, 152, 157, 159, 132,
161, 148, 146, 142, 157, 150, 178, 141, 149, 151, 146, 147, 144, 153, 137, 154,
152, 148 |

- 7| tZvgvġ i we`vj tqi 8g tkiYi 30 Rb Qvġi I Rb (tKwRtZ) wġP t` I qv ntj v :
 40, 55, 42, 42, 45, 50, 50, 56, 50, 45, 42, 40, 43, 47, 43, 50, 46, 45, 42, 43, 44,
 52, 44, 45, 40, 45, 40, 44, 50, 40|
 (K) gvtbi μgvbmvġi mVRl |
 (L) DcvġĖi MYmsL`v mviwY `Zwi Ki |
- 8| tKvġbv Gj vKvi 35wJ cwi evġi i tj vKmsL`v wġP t` I qv ntj v :
 6, 3, 4, 7, 10, 8, 5, 6, 4, 3, 2, 6, 8, 9, 5, 4, 3, 7, 6, 5, 3, 4, 8, 5, 9, 3, 5, 7, 6, 9, 5,
 8, 4, 6, 10|
 tkġYe`wB 2 wġq MYmsL`v MVb Ki |
- 9| 30 Rb kġtKi NĖv cġZ gRvi (UvKvq) wġP t` I qv ntj v :
 20, 22, 30, 25, 28, 30, 35, 40, 25, 20, 28, 40, 45, 50, 40, 35, 40, 35, 25, 35, 35,
 40, 25, 20, 30, 35, 50, 40, 45, 50|
 tkġY e`eavb 5 wġq MYmsL`v mviwY MVb Ki |
- 10| wġPi MYmsL`v mviwY ntZ AvqZtj L AwK Ges cġi K wYġ Ki :

tkġYe`wB	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
MYmsL`v	10	20	35	20	15	10	8	5	3

- 11| AvŠRwZK gvtbi T-20 wġtKU tLj vq tKvġbv `tj i msMpxZ ivb Ges DBtKU cZtbi cwi msL`vb
 wġPi mviwYtZ t` I qv ntj v| AvqZtj L AwK|

I fvi	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ivb	6	8	10	8	12	8	6	12	7	15	10	12	14	10	8	12	8	14	8	6
DBtKU cZb	0	0	0	0	0	1	0	0	0	0	1	0	0	1	1	1	2	0	0	0

- [BwġZ : x-A] eivei I fvi Ges y-A] eivei ivb atġi AvqZtj L AwK| th I fvti DBtKU cZb nq tmB
 I fvti msMpxZ ivtbi Dcti 0•0 wPy w`tq DBtKU cZb tevSvb hvq|
- 12| tZvgvġ i tkġYi 30 Rb wKv`v` D"PZv (tm.wg.) wġP t` I qv ntj v| D"PZvi AvqZtj L AwK Ges Gi
 t`tK cġi K wYġ Ki |
 145, 160, 150, 155, 148, 152, 160, 165, 170, 160, 175, 165, 180, 175, 160, 165,
 145, 155, 175, 170, 165, 175, 145, 170, 165, 160, 180, 170, 165, 150|

DĖi gvj v

Abkxj bx: 1·1

1| (K) 13, (L) 23, (M) 39, (N) 105 ; 2| (K) 15, (L) 31, (M) 63 (N) 102 ; 3| (K) 3, (L) 6, (M) 30, (N) 5 ; 4| (K) 3, (L) 6, (M) 7 ; 5| 15 ; 6| 20|

Abkxj bx: 1·2

1| (L) ; 2| (M) ; 3| 1)(N), 2) (K) 3) (K) ; 4| (N) ; 5| (K) 7140 (L) 19w (M) 16 ; 6| (K) ·6, (L) 1·5, (M) 0·07, (N) 25·32, (O) 0·024, (P) 12·035 ; 7| (K) 2·65, (L) 4·82, (M) 0·19 ; 8| (K) $\frac{1}{8}$, (L) $\frac{7}{11}$, (M) $3\frac{5}{12}$, (N) $5\frac{13}{18}$; 9| (K) 0·926, (L) 1·683, (M) 2·774 ; 10| 84 Rb, 393 Rb ; 11| 52 Rb ; 12| 32 Rb ; 13| 42w ; 14| 225 ; 15| 25 Rb ; 16| 18, 19 ; 17| 4, 5 ; 18| (K) 1, 2, 3, 6 (L) 10 (M) 10 Rb|

Abkxj bx 2·1

1| (K) 3 : 6 :: 5 : 10, (L) 9 : 18 :: 10 : 20, (M) 7 : 28 :: 15 : 60
(N) 12 : 15 :: 20 : 25, (O) 125 : 25 :: 2500 : 500
2| (K) 6 : 12 :: 12 : 24, (L) 25 : 45 :: 45 : 81, (M) 16 : 28 :: 28 : 49
(N) $\frac{5}{7} : 1 :: 1 : \frac{7}{5}$, (O) 1·5 : 4·5 :: 4·5 : 13·5
3| (K) 22, (L) 56, (M) 14, (N) $\frac{7}{6}$, (O) 2·5
4| (K) 14, (L) 55, (M) 48, (N) $\frac{17}{4}$ (O) 6·30
5| 1000 UvKv 6| 3850 w 7| 1000 UvKv, 1400 UvKv, 1800 UvKv
8| i"wg cvte 360 UvKv, tRmrgb cvte 720 UvKv Ges KvKvj cvte 1080 UvKv
9| j wee cvte 450 UvKv, mwg cvte 360 UvKv
10| meR cvte 1800 UvKv, Wwvj g cvte 3000 UvKv I Avbvi cvte 1500 UvKv 11| 10 Mōg
12| 26 : 19 13| 40 : 70 : 49 14| mvi v cvte 4800 UvKv, gvBgpv cvte 3600 UvKv Ges
ivBmv cvte 1200 UvKv 15| 6ō tkŲi QvĤ cvte 1200 UvKv, 7g tkŲi QvĤ cvte 1400 UvKv Ges 8g
tkŲi QvĤ cvte 1600 UvKv 16| BDmŲdi Avq 210 UvKv

Abkxj bx 2·2

1| j vf 125 UvKv 2| ¶wZ 150 UvKv 3| j vf 200 UvKv 4| j vf $5\frac{10}{13}\%$
5| 50 w P†Kv†j U 6| 80 wgUvi 7| ¶wZ $7\frac{17}{19}\%$ 8| j vf 20% 9| j vf $33\frac{1}{3}\%$
10| ¶wZ 20% 11| 420 UvKv 12| $763\frac{8}{9}$ UvKv 13| 188 UvKv 14| 4,761·90 UvKv
15| 8,700 UvKv|

Abkxj bx 2.3

7| 3 w̄tb, 8| $9\frac{3}{5}$ w̄tb, 9| 35 w̄tb, 10| 45 Rb, 11| $10\frac{10}{47}$ w̄tb, 12| $7\frac{1}{5}$ NĖvq, 13|
 6 wK.wg./NĖv, 14| 2 wK.wg./NĖv 15| w̄i cwbtZ tbŠKvi teM 8 wK.wg./NĖv, t̄tZi cwbtZ tbŠKvi
 teM 4 wK.wg./NĖv 16| 84 tn±i, 17| $4\frac{4}{9}$ NĖvq, 18| 8 wgbU ci,
 19| 300 wguvi, 20| 54 tm̄Kb̄|

Abkxj bx 3

1| (K) 0.4039 wK.wg. (L) 0.07525 wK.wg.
 2| 53.7 wguvi, 537 tWm̄wguvi
 3| (K) 30 eM̄guvi, (L) 175 eM̄m̄wguvi
 4| ^N°475 eM̄guvi, cŃ'125 wguvi 5| 30000 UvKv 6| 2000 e.wg. 7| 96 eM̄guvi
 8| 5 tguUK Ub 507 tK.wR. 700 M̄g 9| 1 tguUK Ub 750 tK.wR.
 10| 666 tguUK Ub 666 tK.wR. $666\frac{2}{3}$ M̄g 11| 612 tK.wR.
 12| 145 tK.wR. 950 M̄g 13| 180 gM 14| 549 tK.wR. Pvj Ges 172 tK.wR. 500 M̄g j eY
 15| 1950 UvKv 16| 384 eM̄guvi 17| ^N°21 wguvi I cŃ'7 wguvi

Abkxj bx 4.1

1| $12a^4b$ 2| $30axyz$ 3| $15a^3x^7y$ 4| $-16a^2b^3$ 5| $-20ab^4x^3yz$ 6| $18p^7q^7$
 7| $24m^3a^4x^5$ 8| $-21a^5b^3x^{10}y^5$ 9| $10x^2y+15xy^2$ 10| $45x^4y^2-36x^3y^3$
 11| $2a^5b^2-3a^3b^4+a^3b^2c^2$ 12| $x^7y-x^4y^4+3x^5y^2z$ 13| $6a^2-5ab-6b^2$
 14| a^2-b^2 15| x^4-1 16| $a^3+a^2b+ab^2+b^3$ 17| a^3+b^3
 18| $x^3+3x^2y+3xy^2+y^3$ 19| $x^3-3x^2y+3xy^2-y^3$ 20| x^3+5x^2+3x-9
 21| $a^4+a^2b^2+b^4$ 22| $a^2+b^2+c^2+2ab+2bc+2ca$ 23| $x^4+x^2y^2+y^4$
 24| y^4+y^2+1 26| a^3+b^3

Abkxj bx 4.2

1| $5a^2$ 2| $-8a^3$ 3| $-5a^2x^2$ 4| $-7x^3yz$ 5| $9a^2yz^2$ 6| $11x^2y$
 7| $3a-2b$ 8| $4x^3y^2+x^4y$ 9| $-b+3a^4b^4$ 10| $2a^3b-3ab^2$ 11| $5xy+4x-4x^3$
 12| $3x^6y^4-2x^2yz+z$ 13| $-8ac+5a^3b^2c^4+3ab^4c^2$ 14| a^2b^2 15| $3x+2$
 16| $x-3y$ 17| x^2-xy+y^2 18| $a+2xyz$ 19| $8p^3-12p^2q+18pq^2-27q^3$
 20| $-a^2-4a-16$ 21| $x-4y$ 22| x^2+3 23| x^2+x+1 24| a^2-b^2
 25| $2ab+3d$ 26| x^2y^2-1 27| $1+x-x^3-x^4$ 28| $x-5ab$ 29| xy
 30| abc 31| ax 32| $9x^2-2xy-y^2$ 33| $4a^2+1$ 34| x^2+xy+y^2
 35| a^3+2a^2+a-4 .

Abkxj bx 4.3

- 1| (N) 2| (M) 3| (N) 4| (M) 5| (K) 6| (L) 7| (K) 8| (1)(N) (2)(M) (3)(N)
 9| -21 10| -9 11| 37 12| $x-y-a+b$ 13| $3x+4y-z+b+2c$
 14| $2a+2b-2c$ 15| $7b-2a$ 16| $5a-b+11c$ 17| $2a+3b+28c$
 18| $-10x+14y-18z$ 19| $3x+2$ 20| $2y-9z$ 21| $14-a-5b$ 22| $3a-6b$
 23| $38b-6a$ 24| $a-(b-c+d)$ 25| $a-(b+c-d)-m+(n-x)+y$
 26| $7x+\{-5y-(-8z+9)\}$ 27| (K) $15x^2+2x-1$ (L) $75x^3+20x^2-17x+2$ (M) $3x+2$
 28| (L) $5x+y-z$ (L) $-x+4y+3z-2$, $6x-3y-4z+2$ (M) $-3y-2z-1$
 (N) $2x^2-7xy-6xz-3yz+4x+2y-4y^2$

Abkxj bx 5.1

- 1| $a^2+10a+25$ 2| $25x^2-70x+49$ 3| $9a^2-66axy+121x^2y^2$
 4| $25a^4+90a^2m^2+81m^4$ 5| 3025 6| 980100 7| $x^2y^2-12xy^2+36y^2$
 8| $a^2x^2-2abxy+b^2y^2$ 9| 9409 10| $4x^2+y^2+z^2+4xy-4xz-2yz$
 11| $4a^2+b^2+9c^2-4ab+12ac-6bc$ 12| $x^4+y^4+z^4+2x^2y^2-2x^2z^2-2y^2z^2$
 13| $a^2+4b^2+c^2-4ab-2ac+4bc$ 14| $9x^2+4y^2+z^2-12xy+6xz-4yz$
 15| $b^2c^2+c^2a^2+a^2b^2+2abc^2+2ab^2c+2a^2bc$ 16| $4a^4+4b^2+c^4+8a^2b-4a^2c^2-4bc^2$
 17| 1 18| $81a^2$ 19| $4b^2$ 20| $16x^2$ 21| 81 22| $4c^2d^2$ 23| $9x^2$ 24| $16a^2$
 25| 100 26| 100 27| 1 28| 16 32| 12 33| 79

Abkxj bx 5.2

- 1| $16x^2-9$ 2| $169-144p^2$ 3| a^2b^2-9 4| $100-x^2y^2$ 5| $16x^4-9y^4$
 6| $a^2-b^2-c^2-2bc$ 7| x^4+x^2+1 8| $x^2-3ax+\frac{5}{4}a^2$ 9| $\frac{x^2}{16}-\frac{y^2}{9}$
 10| $a^8+81x^8+9a^4x^4$ 11| x^4-1 12| $81a^4-b^4$

Abkxj bx 5.3

- 1| $x(x+y+z+yz)$ 2| $(a+b)(a+c)$ 3| $(ax+by)(bp+aq)$ 4| $(2x+y)(2x-y)$
 5| $(3a+2b)(3a-2b)$ 6| $(ab+7y)(ab-7y)$ 7| $(2x+3y)(2x-3y)(4x^2+9y^2)$
 8| $(a+x+y)(a-x-y)$ 9| $(3x-5y+8z)(x-y+2z)$ 10| $(3a^2+2a+2)(3a^2-2a+2)$
 11| $2(a+8)(a-5)$ 12| $(y+7)(y-13)$ 13| $(p-8)(p-7)$
 14| $5a^4(3a^2+x^2)(3a^2-x^2)$ 15| $(a+8)(a-5)$ 16| $(x+y)(x-y)(x^2+y^2+2)$
 17| $(x+5)(x+6)$ 18| $(a+b-c)(a-b+c)$ 19| $x^3(12x^2+5a^2)(12x^2-5a^2)$
 20| $(2x+3y+4a)(2x+3y-4a)$

Abkxj bā 5.4

- 1 | (N) 2 | (L) 3 | (K) 4 | (M) 5 | (K) 6 | (M) 7 | (N) 8 | (K) 9 | (L) 10 | (K)
 13 | $3ab^2c$ 14 | $5ab$
 15 | $3a$ 16 | $4ax$ 17 | $(a+b)$ 18 | $(x-y)$ 19 | $(x+4)$ 20 | $a(a+b)$ 21 | $(a+4)$
 22 | $(x-1)$ 23 | $18a^4b^2cd^2$ 24 | $30x^2y^3z^4$ 25 | $6p^2q^2x^2y^2$ 26 | $(b-c)(b+c)^2$
 27 | $x(x^2+3x+2)$ 28 | $5a(9x^2-25y^2)$ 29 | $(x+2)(x-5)^2$ 30 | $(a+5)(a^2-7a+12)$
 31 | $(x-3)(x^2-25)$ 32 | $x(x+2)(x+5)$
 33 | (K) $2(2x+1)$ (L) $4x^2-12x+9$ (M) $4x^2+4x-15$, 9
 34 | (K) $a^2-b^2=(a+b)(a-b)$ (L) $(x+5)(x-2)$ (M) $(x+5)$ (N) $(x^4-625)(x-2)$

Abkxj bā 6.1

- 1 | $\frac{b}{ac}$ 2 | $\frac{a}{b}$ 3 | xyz 4 | $\frac{x}{y}$ 5 | $\frac{2}{3a}$ 6 | $\frac{2a}{1+2b}$ 7 | $\frac{1}{2a-3b}$ 8 | $\frac{a+2}{a-2}$ 9 | $\frac{x-y}{x+y}$
 10 | $\frac{x-3}{x+4}$ 11 | $\frac{a^2}{abc}, \frac{ab}{abc}$ 12 | $\frac{rx}{pqr}, \frac{qy}{pqr}$ 13 | $\frac{4nx}{6mn}, \frac{9my}{6mn}$ 14 | $\frac{a(a+b)}{a^2-b^2}, \frac{b(a-b)}{a^2-b^2}$
 15 | $\frac{(a+2b)x}{a(a^2-4b^2)}, \frac{a(a-2b)y^2}{a(a^2-4b^2)}$ 16 | $\frac{3a}{a(a^2-4)}, \frac{2(a-2)}{a(a^2-4)}$ 17 | $\frac{a}{a^2-9}, \frac{b(a-3)}{a^2-9}$
 18 | $\frac{a(a-b)(a-c)}{(a^2-b^2)(a-c)}, \frac{b(a+b)(a-c)}{(a^2-b^2)(a-c)}, \frac{c(a+b)(a-b)}{(a^2-b^2)(a-c)}$
 19 | $\frac{a^2(a+b)}{a(a^2-b^2)}, \frac{ab(a-b)}{a(a^2-b^2)}, \frac{c(a-b)}{a(a^2-b^2)}$ 20 | $\frac{2(x+3)}{(x+1)(x-2)(x+3)}, \frac{3(x+1)}{(x+1)(x-2)(x+3)}$

Abkxj bā 6.2

- 1 | M 2 | L 3 | K 4 | N 5 | L 6 | (1) N 6 | (2) K 6 | (3) L
 7 | $\frac{3a+2b}{5}$ 8 | $\frac{3}{5x}$ 9 | $\frac{3bx+2ay}{6ab}$ 10 | $\frac{2a(2x-1)}{(x+1)(x-2)}$ 11 | $\frac{a^2+4}{a^2-4}$ 12 | $\frac{4x-17}{(x+1)(x-5)}$
 13 | $\frac{2a-4b}{7}$ 14 | $\frac{2x-4y}{5a}$ 15 | $\frac{ay-2bx}{8xy}$ 16 | $\frac{x}{(x+2)(x+3)}$ 17 | $\frac{q(r-p)}{pqr}$,
 18 | $\frac{x(4y-x)}{y(x^2-4y^2)}$ 19 | $\frac{a}{a^2-6a+5}$ 20 | $\frac{x-3}{x^2-4}$ 21 | $\frac{a}{8}$ 22 | $\frac{a}{6b}$ 23 | $\frac{x^2-y^2+z^2}{xyz}$
 24 | 0 25 | K. $(x+y)(x-4y)$ L. $\frac{x(x-4y)}{(x+y)(x-4y)}, \frac{x(x+y)}{(x+y)(x-4y)}$
 M. $\frac{2x^2-3xy+y}{(x+y)(x-4y)}$ 26 | K. $(a+2)(a-3)$
 L. $\frac{a-3}{(a+2)(a+3)(a-3)}, \frac{a+3}{(a+2)(a+3)(a-3)}$ M. $\frac{a^2+9}{a(a+2)(a^2-9)}$

Abkxj bx 7.1

$$1| 3 \ 2| 2 \ 3| \frac{1}{2} \ 4| \frac{2}{3} \ 5| 3 \ 6| \frac{8}{15} \ 7| \frac{4}{3} \ 8| 4 \ 9| -12 \ 10| 5 \ 11| 1$$

$$12| 8 \ 13| -1 \ 14| -6 \ 15| \frac{19}{3} \ 16| -7 \ 17| 2 \ 18| -1 \ 19| -2 \ 20| 6$$

Abkxj bx 7.2

1| 10 \ 2| 6 \ 3| 12 \ 4| 9 \ 5| 36 \ 6| 20,21,22 \ 7| 25,30 \ 8| MxZv 52 UvKv, wi Zv 58
 UvKv, wgZv 70 UvKv \ 9| LvZv 53 UvKv, Kj g 22 UvKv \ 10| 240wU \ 11| wcZvi eqm 30 eQi,
 cŕî i eqm 5 eQi \ 12| wj Rvi eqm 12 eQi, wkLvi eqm 18 eQi \ 13| 37 ivb \ 14| 25 wK.wg. \ 15|
 ^N©15wgUvi, cŕ' 5wgUvi |

Abkxj bx 7.3

1| L \ 2| M \ 3| M \ 4| K \ 5| L \ 6| (1) M \ 6| (2) (K) \ 6| (3) (L)
 9| (K) \ 4 (L) - 2 (M) \ 5 (N) - 4 (0) \ 2 \ 10| L. \ 2 \ 11| K. (77 - x) wK.wg. \ L. \ 33
 +M. XvKv †_†K Awii Pv : 2 NËv 34 wguU, Awii Pv †_†K XvKv : 1 NËv 55 wguU 30 †m†KŪ |

Abkxj bx 8

1| K \ 2| K \ 3| M \ 4| (1) L, (2) N, (3) L \ 5| K

Abkxj bx 9.2

1| M \ 2| M \ 3| M \ 4| N \ 5| L \ 6| K \ 7| M \ 8| M

Abkxj bx 9.3

1| L \ 2| L \ 3| K \ 4| K \ 5| L

২০১৩

শিক্ষাবর্ষ

৭-গণিত

সমৃদ্ধ বাংলাদেশ গড়ে তোলার জন্য যোগ্যতা অর্জন কর
- মাননীয় প্রধানমন্ত্রী শেখ হাসিনা

আলস্য দোষের আকর



২০১০ শিক্ষাবর্ষ থেকে সরকার কর্তৃক বিনামূল্যে বিতরণের জন্য

মুদ্রণে :